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William deC. Ravenel,
Administrative Assistant to the Secretary,
in Charge of the United States National Museum.

September 15, 1924.

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PALEOCENE PRIMATES OF THE FORT UNION, WITH DISCUSSION OF RELATIONSHIPS OF EOCENE PRIMATES.

By JAMES WILLIAMS GIDLEY,

Assistant Curator, United States National Museum.

INTRODUCTION.

The first important contribution to the knowledge of Fort Union mammalian life was furnished by Dr. Earl Douglass and was based on a small lot of fragmentary material collected by him in the autumn of 1901 from a locality in Sweet Grass County, Montana, about 25 miles northeast of Bigtimber.[1] The fauna described by Douglass indicated a horizon about equivalent in age to the Torrejon of New Mexico, but the presence of unfamilar forms, suggesting a different faunal phase, was recognized.

A few years later (1908 to 1911) this region was much more fully explored for fossil remains by parties of the United States Geological Survey and the United States National Museum. Working under the direction of Dr. T. W. Stanton, Mr. Albert C. Silberling, an energetic and successful collector, procured the first specimens in the winter and spring of 1908, continuing operations intermittently through the following years until the early spring of 1911. The present writer visited the field in 1908 and again in 1909, securing a considerable amount of good material. The net result of this combined field work is the splendid collection now in the National Museum, consisting of about 1,000 specimens, for the most part upper and lower jaw portions carrying teeth in varying numbers, but including also several characteristic foot and limb bones.

Although nearly 10 years have passed since the last of this collection was received, it was not until late in the summer of 1920 that the preparation of the material for study was completed. This task was especially tedious and difficult owing to the small size and exceedingly fragile condition of most of the specimens, it being necessary

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[1] Douglass, Proc. Amer. Philos. Soc., vol. 41, No. 170, 1902, pp. 216-224, pl. 29; Annals Carnegie Mus., vol. 5, No. 2, 1908, pp. 11-26, pls. 1, 2.

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to use a binocular microscope for much of the preparatory work as well as for detailed study of the smaller forms. The collection, representing as it does such a varied fauna, is proving to be most interesting and important, not only in increasing our none too adequate knowledge of earlier Tertiary mammalian life, but in its promise of aid in solving some of the puzzling correlation problems of Paleocene horizons in various localities of the Rocky Mountain region. At least 40 species, most of them new to science, distributed among not less than 15 families, and 6 or possibly 7 orders, are represented. A few of the new species have been described by the present writer in short papers,[2] but now that the whole collection is available for detailed comparison, it is proposed to continue the study by orders, or great groups, the whole eventually to be combined in a single monograph. The Primates form the basis for the present communication.

DESCRIPTION OF SPECIES.

Order PRIMATES.

Up to the present time true Primates of unquestioned standing have not been reported in America from beds older than Lower Eocene, the Puerco and Torrejon having yielded nothing that could be referred with certainty to this order. However, it has been recognized that some, at least, of the Eocene Primates show such marked degrees of advance in development as to suggest a beginning much earlier than the age of the beds (Wasatch and Bridger) in which they have heretofore been found. It is not surprising, therefore, although of the greatest interest, that remains of true Primates are actually found to occur among the abundant faunas of the Fort Union Paleocene. Some of these seem to show undoubted relationship to the already known Primates of the Eocene, while others may represent hitherto unknown groups. All, however, are in general more primitive in type than their supposed relatives of later date, although their stage of development is sufficiently advanced to indicate beyond question that the greater groups, or families, to which they belong were almost as definitely marked out at this earlier period as in the Eocene, and lends abundant support to the suggestion that we must look to formations very much older than the beginning of the Tertiary for evidence, if ever found, of the much-sought root group, or beginning, of the Primates as a distinct order.

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[2] Notes on the fossil mammalian genus Ptilodus, with descriptions of new species. Proc. U. S. Nat. Mus., vol. 36, 1909, pp. 611–626.

An extinct marsupial from the Fort Union with notes on the Myrmecobidae and other families of this group. Proc. U. S. Nat. Mus., vol. 48, 1915, pp. 395–402, pl. 23.

Notice of a new Paleocene mammal, a possible relative of the Titanotheres. Proc. U. S. Nat. Mus., vol. 52, 1917, pp. 431–435, pl. 36.

New species of Claenodonts from the Fort Union (Basal Eocene) of Montana. Bull. Amer. Mus. Nat. His., vol. 41, 1919, pp. 541–555.

Family TARSIIDAE

This family, as defined by Matthew,[3] seems to be represented in the Fort Union by six new species representing four genera, three of which are new. These suggest more or less close relationships to the known Eocene members of the group, but do not fall within the definition of any of the described genera of these later beds.

PAROMOMYS, new genus.

Genotype.—*Paromomys maturus*, new species.

Diagnosis.—Dental formula: $\mathrm{I}\,\frac{?}{1\text{ or }2},\ \mathrm{c}\,\frac{1}{1},\ \mathrm{p}\,\frac{3}{3},\ \mathrm{m}\,\frac{3}{3}$: Species of small size with anterior tooth modifications in general as in the Omomids; that is, with unreduced canine and enlarged median incisor; but with molar developments suggesting *Notharctus* or *Pelycodus* in that they have a lengthened and broadened heel in m_3, and the trigonid is composed principally of the subequal protoconid and metaconid which tend to unite at the summits to form cross lophs; trigonids relatively high and distinctly directed forward.

Other principal features are total absence of internal cingula on the upper molars, the complete continuation of the hypocone ridge to the summit of the protocone, and the relatively greater height of the trigonids of the lower molars. These last two characters seem to be directly associated with and to precede the stage in which a true hypocone is developed. In all forms of this group the development of a true hypocene is accompanied by a corresponding depression of the trigonid.

PAROMOMYS MATURUS, new species.

Figure 1, and Plate 1, figure 3; also Figure 2, and Plate 2, figures 2 and 3.

Type.—Portion of a right lower jaw carrying four teeth, p_4 to m_3 and alveoli for the anterior teeth. (Cat. No. 9473, U.S.N.M. Coll.)

Locality.—"Gidley Quarry,"[4] sec. 23, R. 15 E., T. 5 N., Sweetgrass County, Montana.

Horizon.—Near top of Fort Union "No. 2," of Silberling (Paleocene Tertiary as published by Calvert and Stone). This level or stratum is about 1,300 feet above the base of the beds, which here lie apparently conformably on the Lance formation, and is more than 4,000 feet below the top of the Fort Union in this section.

The species is represented in the collection by portions of upper and lower jaws and teeth of more than 40 individuals, all from the "Gidley Quarry."

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[3] Bull. Amer. Mus. Nat. Hist., vol. 34, 1915, p. 445.

[4] This name was given by Mr. Silberling in his field notes to designate this locality, and is here used or convenience.

Specific characters.—M_1 to m_3 = 9.4 mm.; c (posterior border of alveolus) to m_3 = 17.2 mm. Single enlarged and slightly compressed

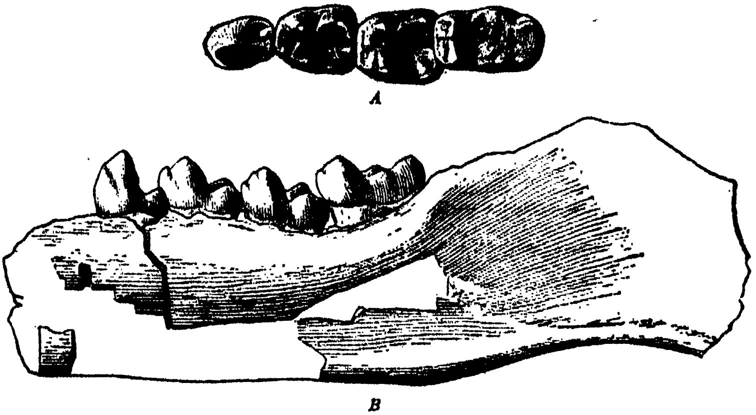

FIG. 1.—PAROMOMYS MATURUS. PORTION OF A RIGHT LOWER JAW CARRYING POSTERIOR FOUR CHEEK TEETH. *A*, CROWN VIEW OF TEETH; *B*, INNER SIDE VIEW OF JAW AND TEETH. ×4/1. CAT. NO. 9473.

incisor as in *Tetonius*, but with canines enlarged also as in *Omomys*; p_2 and p_3 much smaller than p_4; paraconids internally placed and in m_2 and m_3 nearly connate with the metaconid, their summits often disappearing with slight wear; m_3 narrowest but longest of molar series, with wide bicuspid heel as in *Notharctus nunienus* (Cope).

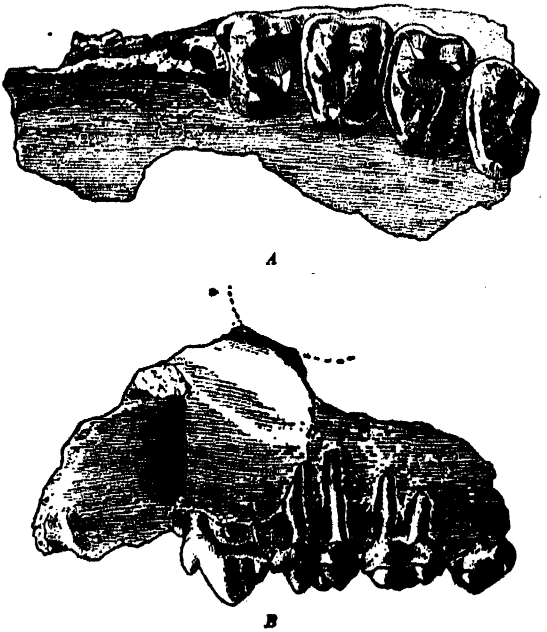

FIG. 2.—PAROMOMYS MATURUS. PORTION OF LEFT MAXILLARY WITH POSTERIOR FOUR CHEEK TEETH. *A*, PALATE VIEW. *B*, OUTER SIDE VIEW. × 4/1. CAT. NO. 9540.

PAROMOMYS DEPRESSIDENS, new species.

Figure 3, and Plate 3, Figure 7.

Type.—Portion of a right maxillary carrying four teeth, p^4 to m^3. (Cat. No. 9546, U.S. N.M. Coll.) Represented in the collection by several other specimens including both upper and lower jaw portions.

Locality and horizon.—Same as *P. maturus*.

Specific characters.—About one-fourth smaller than *P. maturus*. P^4 to m^3 = 7.3 mm., m^1 to m^3 = 5.5 mm. Cusps and lophs depressed and basins shallow; protoconules present but less well defined than *P. maturus;* metaconules absent.

This species further differs from *P. maturus* in the slightly less marked grooving of the inner wall of the protocone-hypocone shelf and the relatively narrower proportions of p^4. Differences correlated with those just pointed out for the upper teeth are effected in the lower teeth of the specimens here associated with this species, though in somewhat less degree. The paraconids are weakly developed, being almost vestigal on m$_2$ and m$_3$, and are closely connate with the metaconids, while the trigonids are more depressed although having the same degree of forward slope as those of *P. maturus.*

Several upper-jaw portions carrying teeth which conform very exactly in size and general modifications with those of the lower series seem to leave little question that they represent the same species. One of these, a portion of a left maxillary carrying four teeth, p$_4$ to m^3 (fig. 2, Cat. No. 9540), shows the following characters: Molars wider than long with three main cusps and two intermediary cuspules, but, while there is no true hypocone, the base of the crown is subquadrangular owing to a backward expansion of the base of the protocone. This expanded area is distinctly marked off from the protocone on the lingual side by a shallow, vertically directed depression, giving the impression of the birth of a hypocone. A low but well-defined ridge, continuing from the posterior cingulum, slopes abruptly upward to the summit of the protocone, thus forming a second shallow posteriorly placed basin of almost equal size and form with the one lying between the median conules. Thus the ridge and cingulum function almost as a hypocone and as already implied there is the suggestion of an early budding off of a mass from the posterior flank of the protocone to form such a cusp. The modification just described is more pronounced in m^1 and m^2, but is also clearly indicated in m^3, and p^4 has a well-developed posterior cingulum and ridge forming with the inner cusp (protocone) a similar basin on this tooth. P^4 also has an incipient metacone placed well down near the posterior extremity of the external cingulum. P^3 and p^2, as indicated by their alveoli, are much smaller than p^4 and are primitively two-rooted; that is, the roots are antero-posteriorly placed. The posterior border of the alveolus for the canine indicates a tooth of moderate size; upper incisors not known. Length of upper cheek-tooth series from posterior border of canine alveolus to posterior border of m^3 = 15.5 mm.; p^4 to m^3 = 10.3 mm. Length of molar series = 7.8 mm. The infraorbital foramen and a short sector of the orbital rim are preserved in this specimen, the latter indicating that the or-

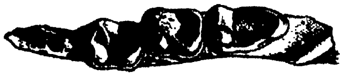

FIG. 3.—PAROMOMYS DEPRESSIDENS. PORTION OF A LEFT LOWER JAW CARRYING THE THREE MOLARS. CROWN VIEW. X 4/1. CAT. NO. 9485.

bit was large but relatively not so forward in position as in *Tetonius*. The infraorbital foramen is large, narrow oval in outline, and placed directly above the junction of p^3 and p^4.

PALAECHTHON, new genus.

Genotype.—*Palaechthon alticuspis*, new species.

Diagnosis.—Dental formula: I $\frac{?}{1 \text{ or } 2}$, c $\frac{?}{1}$, p $\frac{?}{2 \text{ or } 3}$, m $\frac{3}{3}$: Lower incisors reduced to a single enlarged pair, as in *Paromomys*. Canines unreduced, premolars three to two; molars differing from those of *Paromomys* in having relatively shorter basins, and the heel of m_3 is less widened posteriorly; there is no connecting ridge between the subequal proto and meta conids, and the much-reduced but distinct paraconids of m_2 and m_3 are not connate with the metaconids, but are placed well down on the anterior borders of these cusps. The upper dentition is only known from the molar series. These teeth much resemble the corresponding ones of *Paromomys* but may be distinguished by their less expanded inner bases and in consequence more nearly trigonate form. The tendency to division of the lingual wall of the protocone, so characteristic of *Paromomys*, slightly indicated in m^2, but is not present in the other molars.

PALAECHTHON ALTICUSPIS, new species.

Plate 1, Figure 1.

Type.—Portion of a right lower jaw carrying five teeth, p_2 to m_2. Collected by A. C. Silberling. (Cat. No. 9532, U.S.N.M. Coll.) Represented in the collection by other specimens including upper jaws.

Locality and horizon.—Same as *Paromomys maturus*.

Specific characters.—Slightly smaller than *Paromomys depressidens*. P_2 to $m_2 = 9$ mm., posterior border of canine to m_3 (estimated) $= 11.5$ mm. Premolars three, the anterior two reduced and simple; trigonids of molars relatively higher and less forwardly directed than in the *Paromomys* species; cusps of the trigonids very distinct, with deep notches between the subequal protoconid and metaconid, and with small paraconids on all of the molars depressed well below the summit of the metaconid. The heel of m_3 is relatively narrower and is not distinctly biscusped, and the talonid basins of all the molars are distinctly deeper than in the other species. These basins, however, are almost entirely open on the lingual side, there being but a low and deeply notched ridge connecting the entoconid with the metaconid. In *Paromomys* this ridge is nearly as high as the outer border of the basin. P_4 of *P. alticuspis* is more progressive than in the species of *Paromomys*, it having a well-developed though short heel and a rudimentary but distinct metaconid.

The upper molars referred to this species show the following characters: Cusps in general moderately high, median cuspules conspicuous; protocones relatively high and pointed. They differ also from those of the species of *Paromomys* in having the inner posterior portion of the base relatively less expanded and the posterior face of the protocone more steeply sloping. The area bounded by the metaloph, the angulated ridge formed by the posterior basal cingulum, and the continuing ridge from the apex of the protocone, is less distinctly basined. Measurements of upper molars—m^1 to $m^3=5$ mm.

PALAECHTHON MINOR, new species.

Plate 4, Figure 1.

Type.—Greater portion of a right lower jaw carrying four teeth, p_4 to m_3, and the alveoli for p_3 and apparently for a canine and an incisor. (Cat. No. 9639, U.S.N.M. Coll.) Collected by A. C. Silberling. The species is also represented in the collection by a few other specimens, including two upper jaw portions.

Locality and horizon.—Same as for *Paromomys maturus.*

Specific characters.—P_4 to $m_3=5.3$ mm.; m_1 to $m_3=4.3$ mm. About one-third smaller than *P. alticuspis*, with apparently a reduction of premolars to two instead of three, but with canine of moderate size and an enlarged incisor as in the species described above.

This is by far the smallest species of the *Paromomys-Palaechthon* group, and while conforming in general characters with the others, it differs in so many details that its reference here is only provisional. Unfortunately all the jaws in the collection representing this species either have the anterior portion wanting or are broken in that region in such a way as to obscure the modifications that have taken place in the anterior teeth. It is certain, however, that the enlarged incisor was laterally compressed and was decidedly more procumbent than in other species of the group, and that p_2, as well as p_1, is wanting. P_3 is reduced about as in the other species, but p_4 is a high cusped, very much shortened tooth which, except for its shorter heel, more nearly resembles the corresponding tooth in species of *Nothodectes.* The lower molars closely resemble those of *P. alticuspis*, both in the relative height of the trigonids and the distinctness and position of the paraconids. M_3, however, differs from that of *P. alticuspis* in having a narrow, single-cusped heel.

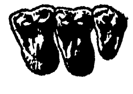

FIG. 4.—PALAECHTHON MINOR. A SERIES OF THREE UPPER MOLARS OF THE LEFT SIDE. ×4/1. CAT. NO. 9590.

A series of three upper molars of the left side (Cat. No. 9590) and a fragment of a left maxillary carrying m^1, m^2 (broken), and the alveoli of m^3 (Cat. No. 9595), seems to be properly referable to this species. These teeth, more than the lower ones described, present the general characteristics of the genus, differing from those of

P. alticuspis only in being proportionately wider, and in having the summit of the somewhat higher protocone relatively more nearly approached to the paracone.

Most of the differences noted above suggest for the species just described a slightly different line, or direction, of development than is indicated in *P. alticuspis*. It is possible, therefore, that more complete materials may prove that these two species do not form a natural generic group. However, for the present they may be treated as such.

RELATIONSHIPS OF THE GENERA PAROMOMYS AND PALAECHTHON.

In the species of genera just described, the molar teeth seem in certain respects to suggest relationship to the Notharctidae. This is especially true of the modifications of m_3 and the position and mode of progressive disappearance of the paraconid in all the molars of the *Paromomys* group. Also there is a significant resemblance in the form and manner of development on the trigonids of the lower molars of an anterior ridge or shelf which takes over the function of the paraconid. This adaptive feature is directly associated with the development in the upper molars of a posterior basal expansion of the protocone, and the forming of a posterior basin, as already described (p. 5). This is similar to the condition observed in the species of *Pelycodus* which have not yet arrived at the stage where the true hypocone appears. It is also a feature of *Phenacolemur* of the Apatemyidae. In fact, this peculiar development of the upper and lower cheek teeth, apparently constitutes a distinctively primate characteristic, which, while not found in all families of the order, seems to have been repeated over and over again, with slight variations, in several related or unrelated groups, and, so far as I am aware, is not found in any other order of mammals. (This is, of course, assuming that the Plesiadapidae are true Primates.) It therefore follows that the apparent likeness of *Paromomys* to the Notharctidae, suggested by similarities of the molar teeth, may or may not denote relationship to this group and seems to be more than outweighed by the important differences observed in the modifications of the anterior teeth. Thus the reduction in *Paromomys* and *Palaechthon* of the premolar series to three or two, and the more advanced specialization and enlargement of a single pair of incisors in the lower jaws are far more important features than the molar resemblance, and seem to preclude the possibility of a near or at least ancestral affinity of the group to the Notharctinae. Also in this group the orbit apparently is of the enlarged type as in the Tarsiidae.

The molars of this group, in some respects also resemble those of the Nothodectids. However, the very marked difference of modifications observed in the last upper premolar, especially, and the different line of specialization indicated in the anterior teeth of the lower jaw (namely the presence in *paromomys* of a well-developed canine, which tooth is entirely wanting in *Nothodectes*) suggest that the relationship of these two groups is not particularly close, although possibly as close as that existing between the Omomids and Notharctids.

Comparing the *Paromomys-Palaechthon* species with the *Omomys-Hemiacodon* species, there is a striking similarity in the general modifications of the anterior teeth of the lower jaws, and it is this feature which has suggested the reference of the Paleocene genera to the Tarsiidae, as that family has been defined by Matthew. These two groups possess in common an unreduced canine and an enlarged incisor, with reduction or loss of the other incisors—an unusual modification. *Paromomys* and *Palaechthon*, although from the older horizon, had, however, reached a somewhat more advanced stage of development in respect to the incisors in that the inner one is relatively more enlarged and the lateral ones are either wanting or are reduced to a functionless remnant. Though usually small, the lateral incisor is always quite prominent in *Omomys* and *Hemiacodon*. In none of the specimens of the Fort Union species is this tooth clearly indicated, but its presence as a mere vestige is suggested in two of them by what appears to be a segment of a very small alveolar border. Hence this tooth, if present, is vestigial.

These differences would be considered slight were the geologic time of occurence of the two forms reversed. Since, however, the more advanced stage belongs to the older form, it here becomes important and precludes the possibility of a direct genetic relationship, even if the marked differences in character of the molars were not considered. But the molars also, and especially those of the upper series, indicate, as already intimated, a distinctly different line of development than is suggested by those of the Omomid group.

From these comparisons it will be observed that the combined characters, especially of *Paromomys*, while presenting in the molars certain Notharctid features, indicate a nearer relationship to the Eocene Tarsiids, although they seem to represent a distinctly different line of development than any of the known later members of the group. The exact place of *Paromomys* and *Palaechthon* in the scheme of classification perhaps can not be assigned with certainty without a much wider knowledge of all of these early Primates than now exists, but I am inclined at present to consider the group represented by these genera as a sixth major division of Matthew's key to the genera of Tarsiidae[5] to be defined as follows:

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[5] Bull. Amer. Mus. Nat. Hist., vol 34, 1915, pp. 447, 448

VI. Paraconids internal, more or less connate with metaconids, metaconids nearly opposite protoconids, no metastylids; m_3 unreduced. One enlarged incisor, the second, if present, vestigial. Canine of moderate size. Jaw moderately slender, front teeth semierect. Premolars two-rooted, anterior ones decidedly smaller than p_4.

1. M_3 with enlarged heel, paraconids vestigial except on m_1. Premolars reduced to three, p_4 with triangular base, well developed heel, but no metaconid. *Paromomys.*
2. M_3 with slightly reduced heel; paraconids distinct. Premolars reduced to two; p_4 with short, basined heel, and with small though distinct metaconid and incipient paraconid.. *Palaechthon.*

ELPHIDOTARSIUS, new genus.

Genotype.—*Elphidotarsius florencae*, new species.

Diagnosis.—Lower molars of *Tetonius* type. M_3 unreduced, m_1 and m_2 short and wide; the outer cusps, especially of the trigonids, set well in from the margin; paraconids distinct and internal on all the molars; subconnate on m_2 and m_3; metaconids more posterior than protoconids, especially on m_1; p_4 enlarged, wedge shaped, with quadrate base. (Anterior teeth and upper dentition not known.)

ELPHIDOTARSIUS FLORENCAE, new species.

Plate 4, Figure 2.

Type.—Portion of a left lower jaw carrying four teeth, p_4 to m_3. (Cat. No. 9411, U.S.N.M. Coll.) Collected by J. W. Gidley.

Locality and horizon.—Fort Union "No. 2," "Gidley Quarry," Sweet Grass County, Montana.

Specific characters.—Size about one-third smaller than *Tetonius homunculus.* M_1 to $m_3 = 4.5$ mm., p_4 to $m_3 = 6.2$ mm., length of $m_3 =$ 2 mm., paraconids internally placed about as in *T. homunculus*, but somewhat more distinct, decidedly more distinct than in *Absarokius abbotti;* metaconids distinctly more posterior in position than protoconids.

The modification of p_4 is peculiar in that its summit is made up of three cusps of subequal size and height, arranged almost in line, giving it a bladelike appearance similar to the p_4 of *Uintanius* as described and figured by Matthew. In addition to the cusps of the trigonid of p_4 there is on its anterior border a small cuspule situated slightly below its summit, and there is a strong but relatively very short heel cusp.

The lower molars of *E. florencae* resemble those of *Absarokius* in having the outer cusps set far in from the margin, and those of *Tetonius* in the relative width of their crowns, which in m_1 and m_2 slightly exceeds their length. They also resemble those of the Eocene genera in that the height of the crowns progressively increases from back to front in the series. In the general evolutionary stage of the lower cheek teeth of *Elphidotarsius* they differ from those of the Eocene members of the group in having the last molar unreduced, while the fourth premolar is well advanced in specialization.

This genus and species are known only from the type specimen, hence its present reference is provisional on what the anterior lower teeth and upper cheek teeth may show when discovered. From the characters presented in the type, the genus would seem to fit best into Division "V" of Matthew's key to the Tarsiidae, under a new subdivision as follows:

> 3. M_3 unreduced, paraconids quite distinct; metaconids posterior to protoconids; p_4 with rather high, laterally compressed summit composed of three cusps, the protoconid, paraconid, and metaconid, all of subequal size and height. *Elphidotarsius*.

TETONIUS REX, new species.

Plate 3, Figure 4.

Type.—A second left lower molar. (Cat. No. 9828, U.S.N.M. Coll.) Collected by A. C. Silberling.

Locality and horizon.—"No. 12," sec. 22, R. 14, E. T. 5 N, Sweet Grass County, Montana. Fort Union "No. 3." In upper part of geologic section.

Specific characters.—Antero-posterior diameter 3.8 mm.; transverse diameter of heel portion 3.5 mm. Lower molars of the broad, low-crowned *Absarokius-Tetonius* type but larger than any described species of these genera.

This species is represented in the collection by the single tooth constituting the type. It merits this distinction only because of the scarcity of material coming from this particular horizon which is nearly 4,000 feet higher in the beds than in the "Gidley Quarry" and "Silberling Quarry" levels, and is therefore here recorded.

Family PLESIADAPIDAE.

As Matthew has defined this family,[a] it includes the "Apatemyidae" on the ground of the apparently close relationship of the American genus *Nothodectes* to the European genus *Plesiadapis*. The *Nothodectes* section of the American group is represented in the Fort Union material by several well-preserved lower jaw portions, a portion of an upper jaw carrying a series of four cheek teeth, and a few characteristic upper incisors. These indicate a new genus closely related to *Nothodectes* of the Tiffany beds.

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[a] Bull. Amer. Mus. Nat. Hist., vol. 37, 1917, p. 833.

PRONOTHODECTES, new genus.

Genotype.—***Pronothodectes matthewi***, new species.

Generic characters.—General characteristics similar to *Nothodectes*, but less advanced in development. Dentition: I $\frac{2?}{1}$, c $\frac{1? \text{ or } 0}{1 \text{ or } 0}$, pms $\frac{4?}{4}$, ms $\frac{3}{3}$. Cusps and cuspules of upper cheek teeth low and rounded; no mesostyles; no definite hypocene or posterior internal ridge, although the protocone is lengthened and slightly angulate in this region. Trigonids of lower molars relatively high with paraconids distinct, but closely connate with the metaconids, and with the nearly equal summits of the metaconids and protoconids relatively more nearly approached than in *Nothodectes*. P_1 and p_2 small and single rooted p_4 with simple high and very short protoconid and short single cusped heel. Upper p^4 submolariform with metaconid equal in height to paraconid and but little separated from it by a very shallow notch.

PRONOTHODECTES MATTHEWI, new species.[1]

Plate 3, Figure 2.

Type.—Three upper cheek-teeth (p^4 to m^2) of the right side in a fragment of the maxillary. (Cat. No. 9547, U.S.N.M. Coll.)

Paratypes.—Greater portion of a left lower jaw carrying the enlarged incisor (broken), pms $_{1, 2, 4}$, and ms $_{1, 2, 3}$ (Cat. No. 9332, U.S. N.M. Coll., see pl. 4, fig. 3; and two upper incisors. (Cat. Nos. 10005 and 10044, U.S.N.M. Coll.)

Locality and horizon.—All from "Gidley Quarry," near top of Fort Union "No. 2," Sweet Grass County, Montana.

Specific characters.—Size about one-fourth smaller than *Nothodectes gidleyi*. P^4 to $m^2 = 5.9$ mm.; m_1 to $m_3 = 7.3$ mm.; p^4 relatively narrower and all molars, both upper and lower, relatively wider than in species of *Nothodectes*. P^4 with paracone and metacone subequal but closely twinned; hypocone ridge only incipiently developed; no diastema in lower jaw; a very much reduced canine indicated; p_1 slightly smaller than P_2; both these teeth simple and single rooted. Trigonid of m_1 with the three cusps about equal in size, their unworn summits forming a nearly equilateral triangle.

Pronothodectes belongs unquestionably to the Plesiadapidae, as defined by Matthew, and seemingly is so closely related to *Nothodectes* that the generic characters based on the material in hand can not be sharply defined.

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[1] I take pleasure in naming this species in honor of my good friend Dr. W. D. Matthew, who has done such splendid work, especially in connection with problems pertaining to the study of the early primates.

It seems to hold about the same position in relation to *Nothodectes* as does *Pelycodus* to *Notharctus*. That is, *Pronothodectes* has not reached a stage so advanced as *Nothodectes*, and stands directly, or nearly directly ancestral to the latter. It is clearly distinguished from *Plesiadapis*, if reliance may be placed upon the figures and descriptions of Lemoine,[a] by the somewhat more advanced modification of the incisors combined with the less progressive condition of the premolars. Also, *Plesiadapis* differs from the related American Nothodectids in that the last upper molar, instead of the second, is the largest of the series.

Two upper incisors (Nos. 10005 and 10044 see pl. 3. figs. 11 and 12) of characteristic pattern, which are of appropriate size, are so very closely like those of *N. gidleyi* as, by analogy, to leave little doubt that they belong to the species here described. If this reference is correct, then the upper incisors of *N. gidleyi* and *P. matthewi* are almost exactly alike in general structure, both differing very distinctly from those of the species of *Plesiadapis* figured by Lemoine. The American species have a more elongate crown and the terminal cuspules are more massive and less sharply pointed, giving them a finger-like appearance.

The fourth upper premolar in *Pronothodectes* seems to be in about the same stage of development as p^3 of *Nothodectes*, and closely resembles it in detail.

The mode of complication tending toward the molariform pattern in the hinder upper premolars of both the American genera (see pl. 3, fig. 3) is identical, and being peculiar, merits description. In general, they are transversely expanded, three-rooted teeth, with large protocone; well-developed protoconule situated in an unusual position between and directly in line with the protocone and paracone; paracone external with metacone budding off from the summit of its posterior flank but becoming progressively distinct. There is also a posterior cingulum running inward and continuing upward to the summit of the protocone, producing a more or less well defined hypocone ridge and basin as in the molars. The upper premolars of the other American members of this group are not known. But according to Lemoine's figures the upper premolars of *Plesiadapis* are of this peculiar type, suggesting that it is characteristic of the Plesiadapidae group and confirms Matthew's observation of the close relationship between *Plesiadapis* and *Nothodectes*.

OTHER PECULIAR INCISORS OF UNCERTAIN REFERENCE.

Plate 3, Figures 8, 9, 10, 13, 14, and 15.

In addition to the two incisors just described, there are in the Fort Union collection several isolated ones which show sufficient peculiarities to make them of interest, and they merit description, although the lack of any clue to their association with other teeth at present renders their reference too conjectural to be attempted.

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[a] Bull. Soc. Geol. de France, ser. 3, vol. 19, 1891, pp. 278-280, pl. 10.

Among these there are three types, differing in detail but of similar general form to those just discussed. The development of lateral cuspulus suggests affinity to the Nothodectids, although accurately associated material, when found, may show they belong rather with some one of the other Primates having a single pair of enlarged incisors, or possibly they are not Primate at all. This seems to be true especially of the smallest of these three types. This tooth (see pl. 3, fig. 10) is very minute and is of appropriate size to go with the diminutive species *Palaechthon minor* to which I am inclined to refer it for this reason. But, of course, correspondence in size alone is no proof of relationship. It must be borne in mind, however, that the material here under discussion came from a single small area of but a few feet in extent, and was confined to a stratum of an average thickness of not more than 4 inches. In such intimate association, size often becomes the key to the solution of proper specific association and sometimes even of individual identity of scattered anatomical parts.

The little incisor, which I take to be an upper one (No. 10090, see pl. 3, fig. 8) is relatively shorter crowned than the corresponding Nothodectid tooth, but gives similar evidence of being one of a single enlarged pair. The tooth is broken off near the base of the crown, obliterating the evidence of whether or not it possessed a heel cusp, but the normal presence of such a cusp is indicated by a sudden increase in convexity of the posterior face of the crown base at the point where it is broken. The crown consists of an elongated and slightly curved principal cusp with its anterior face strongly convex, and with a small concavity near the summit on the external posterior face. As in the Nothodectids, the incisors has two accessory cuspules of unequal size but differently arranged, one being placed above the other on the outer flank of the main cusp.

Based on proportionate size there are two other suggestions of species affiliation for this tooth. The first is that it possibly belongs to one of the small species of a multituberculate, remains of which are abundant in the "Gidley Quarry" material; the second is that it may appertain to a certain species of Insectivore, likewise well represented, which agrees very nearly in size with the little primate *Palaechthon minor*, the species to which I am more inclined to assign it. Against the probability of the Insectivore association is the fact that in none of the families of that group is there any species, known to me, possessing enlarged upper incisors in which the crown has developed lateral cuspules. The Sorecidae, as noted by Matthew, have reduced the number to a single enlarged pair, with elongated, recurved crown on which is developed a posterior basal heel comparable to that observed in the Nothodectids. But this general resemblance seems to me to be only structural parallelism. In favor of the hypothetical reference of this tooth to one of the small Multituberculata, is the fact that, although not corresponding very closely with any known incisors of this group, it approaches the modification observed in certain Multituberculates in just the feature in which it differs the most from the Nothodectid type, namely, in that the accessory cusps are all on one side of the main cusp of the tooth crown, instead of the more symmetrical arrangement seen in *Nothodectes*.

The other two incisors referred to above more nearly conform to the Nothodectid type. One of these (No. 9928), in which there are five instead of three cuspules, has a strongly developed, blunt-heel cusp, a relatively short, posteriorly concave crown composed of a main slightly elongate cusp, with two closely placed cuspules on its inner flank, and two, more widely spaced ones on its outer side. The other tooth (No. 10010) is shorter crowned than the one just described, and the heel cusp is very incipiently developed. It has a single cuspule on either flank of the main cusp as in the Nothodectid incisor, but the flanking cuspules, instead of being rounded in cross section, are greatly expanded to more completely inclose the posterior basin of the crown. The inner cuspule, moreover, is situated much nearer the summit of the crown than is the outer one. In *Nothodectes* the flanking cuspules are of nearly equal height. It is possible that one or both of the last two teeth just described may be upper incisors of some species of the Tarsiid group described above.

The occurrence in this collection of so many incisors presenting variations of the general modification typified in *Nothodectes* and *Pronothodectes* is significant, and suggests that this development is a primate peculiarity which was especially emphasized in the Plesiadapidae with their precociously developed incisors. That the Primates were susceptible to this general type of modification has recently been pointed out to me by my colleague in anatomical research, Dr. Aleš Hrdlička, who has recently made some extended studies and interesting discoveries in connection with certain phases of development of the human teeth. He has found that, not only in man, but in many of the lower anthropoids, the incisor teeth, both upper and lower, frequently have the crown definitely divided into three or more cusps or lobes, a main median and two lateral ones, in varying proportions as to size, associated with two other flanking ridges, and a basal heel cusp. On examining embryos he frequently finds this heel cusp calcifying from a separate center from the remainder of the crown, with which it often very imperfectly fuses. This would seem to indicate that the acquirement of a heel cusp, at least, on the incisors of Primates is a relatively ancient modification, reaching back to an early primitive stage.

Affinities of the Nothodectids.—As already mentioned, the fact is well known that in the study of the early Tertiary mammals one frequently meets with the closest similarity in general molar construction in totally unrelated species. For this reason it is sometimes impossible to assign a species even to its proper order on molar characters alone, and frequently the knowledge of other anatomical features is necessary to confirm actual relationships indicated by dental characters. Matthew, in his discussion of the affinities of Nothodectes, recognizing this fact, has stated that "as to the original reference of the Plesiadapidae I am, as previously, disposed to reserve final decision until the skull and skeleton characters are more fully known,"[9] and while admitting the "strong evidence" of the marked resemblance of the cheek teeth to those of the Eocene Primates, the characters upon which Stehlin based his conclusion that *Plesiadapis* is a true primate, did not consider the similarity of molar structure as a strong argument on the ground that "various other Eocene mammals which are certainly or probably not Primates equally resemble them in molar construction." Nevertheless, I am inclined to think that in his characteristically cautious manner, and with a very commendable desire not to go beyond what substantiated facts clearly warrant, Matthew has somewhat exaggerated the difficulty in distinguishing the teeth of early Primates from those of unrelated forms. Especially does this seem true of certain forms where combined characters of upper and lower dentitions may be considered. For example, in my own experience I know of no species, certainly not primate, in which is found the peculiar combination of modifications described above (p. 8) as characteristic of *Paromomys*, and which is observed also in the Notharctidae and in some at least of the Eocene Tarsiidae. These modifications include for the lower molars a broad basined heel and narrower, more or less forwardly sloping trigonid in which the paraconid is progressively diminishing, or absent, its function being taken over by the anterior cingulum ridge continuing with the anterior flank of the protoconid to form a trigonid basin similar to but smaller and more elevated in position than the talonid depression; while the correlated modifications of the upper molars are a shallow anterior basin external to the protocone, which basin and cone function with the talonid portion of the corresponding lower molar, and a posterior basin, somewhat higher in position, formed by the posterior cingulum ridge continuing with the backwardly expanded border of the protocone to the summit of that cusp. The latter basin and ridge function with the trigonid of the lower molar next behind. This peculiar structure of the upper molars at least, while apparently distinctively primate, is, however, not observed in all groups of the order. But the stage just described, which in the Notharctidae is followed by the budding off of a hypocone from the posterior flank of the protocone, seems to have been an important basis of modification in all the anthropoids, including man, and in some but not all groups of Lemurs. The molar pattern of modern anthropoids seems to have been built on this model.

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[9] Bull. Amer. Mus. Nat. Hist., vol. 37, 1917, p. 837.

The general molar structure just described is most clearly distinguished in some of the South American monkeys, but is somewhat obscured in most of the Old World forms through the greater development of the hypocene and the general evening up of the four principal cusps in all the molars to form a subequally quadricusped tooth. Even in these, however, the double basin, or valley structure still persists although greatly modified by the lowering and enlargement of the four main cusps of the molar crown, and the consequent shifting of the anterior and posterior basins to the same level.

It would thus seem that the similarity of the molars of *Nothodectes* to those of the Notharctidae after all has more significance than was conceded by Matthew, and, taken together with the character of the premolars and of the incisors as above interpreted, leaves little doubt regarding the primate affinities of the Plesiadapidae.

Since writing the above, Doctor Matthew has informed me in conversation that the American Museum now has additional material of *Nothodectes* which includes associated foot bones. These, according to Matthew, are "tupaioid-insectivore in type." For this reason he now concludes that the Plesiadapidae are not Primates but should be considered true insectivores. I can not, however, entirely concur with Matthew in this opinion, for, granting the tupaioid character of the foot bones of *Nothodectes*, this would mean nothing beyond indicating a primitive condition which might be expected in almost any of the earlier groups of Primates, especially in view of the fact that the living Tupaiids are primatelike in many important features.

In interpreting the meaning of a tupaialike foot structure in these early forms, the fact must be considered that the *Tupaia* foot more nearly resembles that of the little-specialized South American Primates than it does other living families of insectivores. Comparison of the hind foot of *Hapale* with that of *Tupaia* shows such striking resemblances that were the bones of these two types of feet found fossil in the same beds they would be difficultly separable, and would surely be considered not more than generically distinct. It would seem, therefore, that the tupaioid-insectivore, or Menotyphla, type of foot may have given rise to the primate types. If, therefore, a living primate has retained a foot structure which, if not typically tupaioid, is directly derivable from such a type, might it not naturally be expected that many of the early Eocene and Paleocene representatives of the Primates would have just such a type of foot?

OBSERVATIONS ON THE EVOLUTIONARY STAGE AND SYSTEMATIC POSITION OF THE EARLY TERTIARY PRIMATES.

While great process has been made in recent years in our understanding of tooth structure, giving more confidence in its use, it is fully appreciated as already acknowledged, that there are many difficulties and hazards to be encountered in attempting, on dental characters alone, criticisms of or deviations from widely accepted opinions. However, this brief restudy undertaken from the angle of an earlier phase has deeply impressed the present writer with the suggestion that certain widely accepted views regarding the Eocene Primates should be very considerably modified to come in agreement with our increasing knowledge of facts, acquired though it be for the greater part through the study of dental characters; for notwithstanding the greatly augmented collections of the past 20 years, it is on the study of those characters, for the most part, that we must still rely for our information regarding the greater number of species of the early Tertiary.

Owing to this treacherous resemblance of tooth structure in entirely unrelated forms (a fact long recognized) there existed, up to the time of the discovery of skull and skeleton portions which gave some knowledge of other anatomical characters, the widest differences of opinion regarding the proper ordinal position of the earlier described Eocene Primates. For example, when *Notharctus*, which was founded on a lower jaw, was described by Leidy in 1870, it was not definitely referred to any existing order of mammals, Leidy considering that it carried resemblances in tooth structure to both the Carnivora and to certain Eocene "pachyderms." The next year (1871) Marsh likewise described a similar lower jaw fragment, noting resemblances to a contemporaneous genus *Hyopsodus*, a supposed suilline. Cope, for some time misled by a false association of creodont ungual phalanges with teeth belonging to a species of the *Notharctus* group, failed to recognize the full primate affinities of the Notharctids and placed them with a rather heterogeneous group of genera under a new suborder, Mesodonta, which he considered as holding about the same relationship to the Primates as the Creodonta to the Carnivora. Later, each of these authorities recognized true Primate characteristics in this group as well as the contemporaneous "Anatomorphous" group, but got little further than that in their classification.

This illustrates well the rather chaotic condition of our knowledge of the early North American Primates up to the time of their first revision by Osborn in 1902,[10] and also emphasizes the difficulties encountered in attempting to work out their relationships. Osborn cleared up much of this confusion, and laid the foundation for all systematic work on the *Notharctus* group which followed. Since the time of Osborn's revision, aided by the fine collections of better material, including skull and skeletal portions obtained by various expeditions of the American Museum of Natural History, the systematic development of the group has been wonderfully extended. The later researches, especially of Osborn, Wortman, Matthew, Gregory, and Granger in America, and Filhol, Schlosser, and Stehlin in Europe, have given a very comprehensive knowledge of the known groups of Eocene Primates, although there is still wide disagreement among students of the problem regarding their exact systematic position and the relationships they hold to the modern members of the order.

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[10] Bull. Amer. Mus. Nat. Hist., vol. 16, art. 17 1902,, pp. 169-241.

It is not within the scope of the present communication to enter into a detailed examination of all the wider aspects of these controversies. However, the foregoing studies of this newly discovered older Primate fauna, besides contributing to our knowledge of the Eocene groups to which they are related, seem also to throw added light on the more interesting problem of the origin of the Primates, and it is their bearing on this particular phase of the subject which seems important to discuss here.

Wortman went deeply into the study of these early forms, the results of his research, which was based in part on material of the Marsh collection at Yale University, being published in a series of articles under the subheading "Part II, Primates," in the American Journal of Science (vols. 15 to 17, 1903-1904). He there set forth and ably upheld the view that most at least of the known Eocene Primates are not Lemurs but true Anthropoids, and in defending this ground, proposed a new classification and arrangement of the greater groups of the order,[11] defining them to include the known extinct forms with the living species. In this rearrangement the Eocene genera *Adapis*, *Notharctus*, and *Limnotherium* (Adapidae), and the *Hemiacodon-Washakius* group (Tarsiidae of Matthew in part) are included with the "Cebidae, Cercopithecidae, Simiidae, and Hominidae" under the "Neopithecini," a major group of the Anthropoidea, while the *Anaptomorphus* (=*Tetonius*) group was included with the living genus *Tarsius* under the "Paleopithecini" of this suborder.

A few years later, Gregory[12] likewise published a comprehensive restudy of the early Primates, based on extensive researches of both living and extinct forms of the order. In these treatises Gregory vigorously opposed Wortman's ideas of classification and phylogenies, taking the more generally accepted view that all the known Eocene

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[11] Amer. Journ. Sci., ser. 4, vol. 15, 1903, pp. 411-414.

[12] Bull. Geol. Soc. Amer., vol. 26, 1915, pp. 419-442; Bull. Amer. Mus. Nat. Hist., vol. 35, art. 19, 1916, pp. 239-355; Mem. Amer. Mus. Nat. Hist., new ser., vol 3, pt. 2, 1920, pp. 49-241.

Primates are primitive Lemurs, and classing them under "series Lemuriformes" of the suborder Lemuroidea which he defined to include them.[15] He here considered the Adapidae of both America and Europe "typically lemuriform," and not only concluded that this group "should be assigned to the suborder Lemuroidea" but "that the older North American representatives of the family are the most primitive known lemuroids." However, in criticising Wortman's treatment of the Adapidae, in which he placed this group together with the living Hapalidae of South America in the suborder Anthropoidea, Gregory conceded the possibility that subsequent discovery might prove "that the earliest members of the Notharctine or North American division of this family gave rise to the Platyrrhinae, or monkeys of the New World."

Both these able authorities have brought forward many and vigorous arguments to sustain their opposing views, some of which will have to await further discovery and wider anatomical knowledge of many of the forms discussed to prove or disprove their validity. Others will lose or gain in weight in the mind of the future investigator, perhaps, according to his personal viewpoint or interpretation of the facts. The last statement is especially true respecting the conclusions which may be reached regarding the evolutionary stage which had been reached by the earlier Primates, especially as the list of known forms is now increased by the several additional species of Palaeocene age. In fact, different interpretation of characters seems to have been the real source of the disagreements encountered in the discussions defended by Wortman and Gregory. The latter seemed to hold the, I believe, usually accepted view that the Eocene Primates, while having fully attained the characters of the order, are exceedingly primitive creatures, none of them having passed beyond the early lemuroid stage, and between which and present-day forms exists an evolutionary gap sufficiently wide to admit the derivation of most if not all of the modern families of both Lemurs and Anthropoids. Wortman, while apparently influenced by this general idea of antiquity, seemed to consider it possible, in some cases at least, to bridge this gap, and has gone more boldly into the problem of working out a phyletic classification based on actual anatomical similarities, which may characterize the several lines of descent as indicated by their supposed evolutionary history. It was on this basis that he reclassified the Primates, referring all the known Eocene forms to primary divisions of the Anthropoidea. Besides the two major divisions already mentioned, Wortman, in this reclassification, recognized still another, the "Arctopithecini," adapted from Huxley's classification, and which includes the living marmosets. The Paleopithecini, as already stated, includes the living *Tarsius* and part of the Eocene genera which later were referred to the Tarsiidae by Matthew; while in the Neopothecini, Wortman included *Omomys* and *Washakius*, (also referred by Matthew to the Tarsiidae) and the Adapidae, together with all the Old World families of living Anthropopoidea and those of the New World except the Hapalidae.

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[15] Bull. Amer. Mus. Nat. Hist., vol. 35, 1916, pp. 266,267.

The foregoing, in brief, seems to be about the present status of that part of the controversy which concerns the subject here under consideration. Gregory's views, based on later studies and somewhat fuller data, have received the wider acceptance. But the present restudy of the Eocene Primates, supplemented by the new material from the Fort Union beds described above, has brought to light certain features which lead me to views differing widely from those held by Gregory regarding both the extreme primitive character of these early forms and their relationships to the modern groups. Wortman's views in part seem to agree more nearly with my own interpretation of the facts, although his conclusions, especially regarding classification, apparently will require modifications in several very important particulars.

In this connection should be noted more fully Matthew's comprehensive revision of the Eocene Primates to which reference has already been made.[14] In this revision Matthew has most admirably worked out, so far as can be done on present known material, the interrelationships of the Eocene Primates, some of the genera and families being for the first time adequately defined. Two groups of undoubted primate affinities (the Adapidae and the Tarsiidae) were here recognized, and it was suggested that "some or all of the genera of the families Apatemyidae and Mixodectidae, here placed as Insectivora, may when better known have to be transferred to the Primates." Matthew included under the first family the American forms *Notharctus* Leidy and *Pelycodus* Cope as genera representing two successive stages of a single phylum. Under the Tarsiid group he recognized provisionally nine American Eocene genera as being more or less closely related forms of Tarsiid type, and because of the lack of knowledge of many of them by which they might be placed in families or subfamilies and adequately defined, he arranged them, with the living genus *Tarsius*, under a very convenient classificatory key of five major divisions.

The material from the Fort Union seems entirely to confirm Matthew's general conception of the early Primates in their relation to each other as expressed in this revision, but lends no support, as already intimated, to the prevailing ideas of their relationship to the modern groups of the order, except as regards *Tarsius*.

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[14] Bull. Amer. Mus. Nat. Hist., vol. 34, 1915, pp. 429–483.

RESTUDY OF EOCENE AND PALEOCENE TARSIIDS.

In order to arrive at any definite or satisfactory conclusions regarding the approximate stages of evolution which may have been reached by any group of animals at a given geologic period, it is first necessary to determine as nearly as possible what characters presented are basic or primitive, and what features may be regarded as marking definite lines or trends in development. Where ancestral forms and immediate descendants are known, the problem is comparatively simple and there is little chance of disagreement; but where these are not known, the task is more difficult and the chances for agreement are, in the very nature of the case, much diminished since most of the conclusions are arrived at through inferences drawn from comparisons with similar but often wholly unrelated forms. The difficulty seems to be increased when dealing with an order such as the Primates, where many features in all groups even of its living representatives are still in a stage relatively not far removed from the generalized base-structure of primitive mammals.

Keeping these facts in mind, and also remembering that various specializations in certain groups have progressed much more rapidly than in others, and that as we approach the common origin of the groups the less conspicuous become the differences in these modifications, let us reexamine the evidence presented by the early Tertiary representatives of the order.

The Lower and Middle Eocene Tarsiids include nine genera referred by Matthew, as already stated, to four key groups, as indicated by lower jaw characters.[15] Among them are represented a rather wide variety of forms, yet all show a definite trend in the same general direction.

The Fort Union Tarsiids, represented by *Paromomys*, *Palaechthon*, and *Elphidotarsius*, as defined, add one or possibly two more groups of similar rank, making in all at least five major groups of the Tarsiidae represented in the early Tertiary deposits of America. The exact taxonomic rank of these groups is not known. As Matthew has quite justly concluded, our present knowledge is insufficient to properly define them as families or even subfamilies, either of which they may prove to be. The important fact in this connection is that as at present known they all exhibit certain features, some more than others, which suggest *Tarsius* affinities, and on present evidence seem properly to belong in the same family as the living Tarsiers, although none of the Eocene genera exhibit a combination of characters which would warrant considering them directly ancestral to the latter, and much less to any other modern group of Primates. In fact, there is little ground for assuming, as seems to have been done by certain authorities, that some members of the Eocene Tarsiids could have given rise to any part of either the Anthropoidea or the modern Lemurs, exclusive of *Tarsius* and *Daubentonia* with the single possible exception of the South American squirrel-monkey group, which may have been derived from some member of this group more nearly related to the Notharctinae as suggested by Wortman. The special trend in development, as indicated by modifications of the anterior teeth, in many of these forms would alone seem not to be consistent with such a conclusion. Moreover, the skull and limb characters, so far as known, likewise indicate *Tarsius* affinities; hence it would seem that, as regards the relationship of this group of early Primates to the modern members of the order, it may be assumed that the most which can be claimed on present evidence is, that among the living Primates, the Tarsiers, only, are probable descendants of some as yet unknown genus of the group. Possibly, also but I think not probably, some genus now considered a member of the early Tarsiids may have given origin to the group represented by the modern Aye Aye (*Daubentonia*).

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[15] A fifth group (numbered "I" in Matthew's key) is represented by the living Tarsiers. For complete definitions of these groups see Matthew, Bull. Amer. Mus. Nat. Hist., vol. 34, 1915, pp. 429-483.

These conclusions regarding the phylogenetic position of the early Tarsiids are, in my opinion, greatly strengthened, and, to a degree, verified by the additional knowledge gained from the Fort Union members of the family. Although indicating a somewhat less specialized development, these older genera are apparently little or no nearer the condition required of a root group than are their relatives of the Wasatch and Bridger, their evolutionary trend being as clearly indicated as in the latter. Thus the evidence seems rather clear that the Tarsiidae represent a very ancient major group of the order having a pre-Tertiary origin, possibly in common with the Anthropoidea, but developing, at least from the beginning of the Tertiary on, independently of either the anthropoids or true lemurs. This would seem to support Wortman's view in so far as he regarded *Tarsius* and its nearer Eocene relatives as having Anthropoidea affinities; but it lends no support to his seemingly unnatural association in which he placed a part of the Tarsiidae with the Hapalidae under a major group of this suborder. The little marmosets, as rightly contended by Gregory, give every evidence of having had a common origin with the other families of the so-called Platyrrhinae and should not be separated from that group despite the unique features among modern Primates of the claw-like terminal phalanges and the nonopposability of the pollex. I do not, however, agree with Gregory's expressed belief that these are either retrogressive or specialized characters, but believe rather, as I have formerly held,[16] that both characters pertain to a primitive condition retained in this particular group because of their very diminutive size and slight weight, which did not require opposability of the first digits to adapt them to a perfect arboreal life; the spreading, clawed foot being sufficient in these little creatures to give a firm and secure grasp of a tree trunk or limb under all conditions, just as they do for the tree-living squirrels, insectivores, etc. Thus in all these forms, opposability, if it may be so termed, is developed between two feet clasping opposite sides of a branch, instead of between the first digit and the others of each foot. The possible origin of the South American monkeys is discussed more fully under the next heading.

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[16] Washington Acad. Sci. Proc., vol. 9, 1919, p. 277.

RESTUDY OF THE AMERICAN NOTHARCTIDS.

Although no representative of the Notharctid group of Primates appears in the Fort Union collection, the fact that certain species found in these beds belong to well-developed major groups of the Tarsiids, which are almost as clearly defined as their Eocene relatives, makes it exceedingly probable that the Notharctids also existed at that time as a distinct group, and this fact furnishes good ground for a restudy of these Primates[17] from the viewpoint of their being a much less primitive and less basic group than has been assumed by Doctor Gregory. In his recent admirable and exhaustive monographic memoir on the subject,[18] Gregory has studied in detail the tooth, skull, and skeletal characters, comparing them at great length with the modern Primates, and especially the Madagascar lemurs. From this and earlier studies he has concluded that the members of the Notharctid group are "true lemurs," sufficiently primitive to be considered as standing near the base of the order and "represent in many respects the earliest ancestors of the higher Primates" (see p. 22). In this connection he writes also that "they also tend to connect the Primates with some group of arboreal insectivores, probably of the Mesozoic ancestors of the Menotyphia."

I can not agree with Doctor Gregory in these conclusions, either as to his assumed ancestral relationship of the Notharctinae to the modern Primates or the extreme primitive stage to which he assigned this group. This for two reasons, first, because of the facts stated above regarding the relatively advanced condition of the major groups of the Tarsiidae including those discovered in the Fort Union (Paleocene), and second, because of different interpretations and values which may be given to many of the morphological characters exhibited in the known materials representing the Notharctid group.

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[17] Since the present writer has not had for comparison at first hand any of the European Adapinae material, this group has for the most part been left out of the discussion. However, it may be stated that Gregory's disposition of the group, in which he follows Stehlen, regarding its relationship to the Notharctinae is for the present accepted. Hence, the broader conclusions here reached regarding the Notharctinae may apply equally well to the Adapinae.

[18] Memoirs Amer. Mus. Nat. Hist., new ser., vol. 3, pt. 2, September, 1920

It is not within the scope of the present discussion to review in its entirety this admirable memoir, much of which is devoted to the accurate working out and discussion in masterful detail of many important morphological features of both extinct and modern Primates. It suffices for the present purpose merely to reexamine critically some of the seemingly more important anatomical features discussed by Gregory which characterize the Notharctinae and relate especially to the question of the affinities of the group. In this regard Gregory has described in great detail the structural modifications of the skeletal elements of *Notharctus* based on the splendid material in the American Museum's collection, and in so doing has established beyond question the fact that the Eocene Notharctids were true Primates, and that they were still in a relatively primitive or generalized stage of development. But, in my opinion, he seemed too greatly impressed with the primitive features of the Notharctids and with the many resemblances he found between this group of early Primates and the Madagascar lemurs, and did not consider sufficiently, or has failed to interpret properly, the special trends in development indicated in the general skeletal structure of the Notharctids. This opinion is based on a detailed restudy of the problem in which the evidence presented by Gregory has been carefully considered, while the fine osteological collections of modern Primates in the United States National Museum, the casts of most of the skeletal elements of *Notharctus* kindly furnished by the American Museum, and a small amount of actual *Notharctus* material in the National Museum have been used for comparison and study. The following comparisons and criticisms are taken up in the order discussed by Gregory.

A portion of the lower end of a scapula of *Notharctus osborni* was described by Gregory (p. 63). Of this fragment he said: "By far the nearest resemblances of the part preserved are with the lemurs of Madagascar," and stated that the glenoid fossa, as seen from below, is like a "slender pear," and that "a very similar form is seen in a certain specimen of *Lemur mongoz.*" He then pointed out differences between it and *Cebus*, *Alouatta*, and even *Hapale*, but did not note the striking resemblance of the *Notharctus* scapula fragment to the corresponding portion of that of *Hapale* and *Aotus*, in which forms this element is still in almost as primitive a stage as in *Notharctus*, and to which Gregory's description would apply almost equally well. Moreover, Gregory's figure of the *Notharctus* fragment (fig. 1, p. 63) shows a notch just above the coracoid. This is drawn apparently as though broken, but if, as seems possible, it should prove to be a true notch, it would have an important significance since it is in the exact position of the *suprascapular notch* of human anatomy. This characteristic notch is found in all the South American monkeys, sometimes becoming a more or less completely closed foramen as in

Alouatta and *Cebus;* and, so far as I have observed, does not occur in any modern lemurs or in the Old World anthropoids.

The *clavicle* of *Notharctus*, represented by the "medial half," is described as similar to that of *Lemur mongoz*, but, according to Gregory, it has a "stouter, less compressed shaft and a less expanded facet for the sternum." Gregory also stated that this portion of the clavicle is nearly straight. These features are true also of this portion of the clavicle in *Alouatta.* In this genus the medial portion is almost straight and is as round in cross section as in *Notharctus.*

In discussing the *humerus* of *Notharctus*, Gregory has said (p. 76) that "the nearest structural resemblances are to be found among the Lemuriformes, especially among the Adapidae and Lemuridae. Hence the humerus of *Notharctus*, as well as the great majority of all other elements of the skeleton, is plainly lemuriform, or better, in a prelemuriform stage of evolution." This statement, applied to a comparison of *Notharctus* with the Old World anthropoids and man, is in general quite true, as was clearly demonstrated by Gregory, but when the South American monkeys and the African continental and Asiatic lemurs are considered, the "lemur" characteristics seem not so well founded, and his conclusion of a "prelemuriform stage" does not seem to follow, unless we are to consider the modern Madagascar lemurs to be still in the prelemuriform stage. In fact, modifications noted in the humerus of the living South American group seem to have a definitely closer connection with the Notharctid type than do those of the modern true lemurs. For example, although the shaft is greatly lengthened (an obviously modern specialization), the sigmoid, or S-shaped contour of the humerus of *Alouatta,* viewed from the side, is almost as marked as in *Notharctus*, and as fully or even more marked than that of *Lemur cattus*, while the deltoid ridge and supinator crest are almost as strongly prominent as in those of *Lemur.* In *Hapale* the deltoid ridge is more strongly produced than in *Lemur cattus.* In *Cebus* and *Aotus* this element is more reduced. As noted by Gregory, in several of the South American monkeys the entepicondylar foramen is as prominently present as in *Notharctus.* Comparing further, the heads of the humeri in the various Platyrrhine are also but little modified beyond the stage observed in *Notharctus*, those of *Cebus* and *Hapale* being closely similar. That of *Alouatta* is slightly more compressed and less "globular" in form, while in all the inclination and direction of the head is directly toward the back of the shaft, as in *Notharctus*, and the bicipital groove is relatively wider and shallow. An apparently important character, not noted by Gregory, in which the *Notharctus* humerus differs from all lemurs and resembles the Anthropoidea, is the angle which the base plane of the ball portion of the head makes with the long axis of the upper shaft. In *Notharctus* this angle is about the same as in the South

American monkeys and the Anthropoidea in general, namely, about 40°. In the Madagascar lemurs, even in such divergent forms as *Microcebus* and *Daubentonia,* this angle is diminished by nearly one-half, bringing the head closer to the shaft in the lemurs than in *Notharctus* and the Anthropoidea. This feature denotes a similarity between *Notharctus* and the anthropoids in the angulation of the scapula with the humerus, which is not shared by the lemurs.

One other important feature of the humerus remains to be considered, namely the modifications of the distal end. In his table of comparisons between the humerus of *Notharctus* and those of the anthropoid apes and man, Gregory has noted that the capitellum is "ball-like in center, produced externally toward very inconspicuous external epicondyle" and that the trochlea is not grooved. The first of these distinctions is not quite clear, since the figures given by Gregory as well as the cast in hand indicate a very conspicuous external epicondyle. But the important obervation in this connection would seem to be that the capitellum is but slightly more globular or "ball-like" than that of the South American monkeys, is decidedly more rounded externally than in many of the lemurs; and, with the diminishing of the supinator ridge, which would bring the epicondyle closer in, the modification to the condition found in the Platyrrhine monkeys would readily be accomplished. From the *Notharctus* stage to such a modification as that observed in the African lemur *Perodicticus potto,* in which there is a well-developed additional external groove and ridge not found among the Anthropoidae, the transition would be far more difficult. This feature in *Perodicticus* is indicated in the less progressive humerus of *Lepidolemur,* and is the more significant since between the humeri of the two lemurs just mentioned, there is about the same degree of progressive development as between those of *Notharctus* and *Alouatta* or *Hapale,* the Madagascar lemurs being nearer the stage of *Notharctus* with its broadly expanded supinator ridge and well-developed entepicondylar foramen, the continental lemur approximating the Platyrrhines just named in having no entepicondylar foramen, and having a greatly diminished supinator ridge.

Regarding the absence in *Northarctus* of the trochlear groove, this also is conspicuously absent in *Alouatta,* and absent or but slightly indicated in the other South American monkeys.

Still another anthropoid and nonlemurine feature of the *Notharctus* humerus is observed in the very pronounced upward sloping of the trochlear toward the base of the capitellum. This feature is also very marked in *Alouatta.*

Continuing with the *radius* and *ulna,* again Gregory has emphasized the special likeness of these elements to those of the lemurs, but many of the differences pointed out by him in comparing them with

Lepilemur and *Lemur* are just the differences observed in comparing the Platyrrhini with these lemurs, and again, the characters of these elements in *Notharctus* are either like or definitely tending toward the South American monkeys rather than the lemurs. For example, the greater width of the shaft at the lower end, the better development of the eminences for the attachment of the pronator radii teres on the mid-anterior border of the radial shaft, the less sharply marked interrosseus ridge, the thinner anterior border of the radial shaft, characters noted by Gregory, are all Platyrrhine modifications. To these may be added the greater width of the proximal end of the shaft of the ulna; less curved distal portion of the ulnar shaft; the definitely greater relative distance of the biceps tuberosity below the head of the radius; and the modifications of the distal end of the radius which are definitely tending toward the Platyrrhine type, especially as exemplified in *Hapale*. In this respect the radius of *Hapale* seems to stand structurally almost intermediate between that of *Notharctus* and *Alouatta*..

The *manus* of *Notharctus* is unquestionably primitive in structure; and, as brought out but not so stated by Gregory, differs as widely from the lemur as from the Platyrrhine manus. For this reason, therefore, the evidence derived from it is largely negative in character and need not here be discussed in detail.

In describing the pelvis of *Notharctus*, Gregory stated (p. 83) "it is essentially of lemurine type," and that "it differed in many particulars from the pelvis of New World monkeys, Old World monkeys, apes, and man; it is in each case more primitive—that is, very close to the tupaioid or Menotyphla type." Continuing in more detail he stated that "as viewed from below, the opposite halves of the pelvis of *Notharctus* form a sort of lyre, the blades of the ilia diverging antero-externally beyond the first sacral vertebra," and that "in all lemurs this feature is still more pronounced," while in the New World monkeys "in the ventral view the opposite ilia are more parallel to each other and do not diverge anteriorly." He noted also the presence in the pelvis of *Notharctus* of a well-defined anteacetabular spine and other features which he considered lemurine and not anthropoid.

This presentation seems rather convincing as stated and as illustrated by the specimens of recent forms selected and figured by Gregory, but I do not find his contentions substantiated by the material I have had in hand for comparison. First of all Gregory's comparisons on the lemur side were evidently made with Madagascar species only, as his statements do not apply in any degree to the Continental or Asiatic lemurs. If such a form as *Perodicticus potto* is considered, the "lemurlike" characters of the pelvis of *Notharctus*, noted by Gregory, almost totally disappear. In this Continental lemur (see pl. 5, fig. 6) the ilia are almost straight and rodlike, and the anterior ends, which extend but slightly beyond the sacrum attachment, are but little expanded vertically. There is no gluteal fossa and no vestige or suggestion of the anteacetabular process noted by Gregory as being prominent "in *Notharctus* and in the lemurs." Moreover, the ilia in *Perodicticus* are strongly attached to two sacral vertebrae and the anterior part of a third, instead of one as noted by Gregory for the Madagascar lemurs. On the whole, the pelvis of *Perodicticus* much more nearly resembles that of the insectivore *Solenodon* (see pl. 5, fig. 4), and it is difficult to conceive of its derivation from any such form as that of *Notharctus*.

On the anthropoidian side, Gregory seems to have been unfortunate in choosing for his principal comparisons a pelvis of *Cebus* in which the basic characters are obscured by greatly expanded (modern) ilia. In fact, with all deference to Doctor Gregory's opinion to the contrary, my own investigations, which include a critical comparison of the pelvic structure in all the available forms of lemurs and of South American monkeys, lead me to conclude that after all there is between *Notharctus* and the South American monkeys a striking similarity in the fundamental structure of the pelvis, and that each modern form is directly derivable, with relatively slight modifications, from the Notharctid type. Comparing the pelvis of *Alouatta* (see pl. 5, fig. 2), the lyrate form is seen to be quite similar to that observed in *Notharctus*, and would be more strikingly apparent were it not for the slight expansion in *Alouatta* of the external iliac borders. This lyrate form may be seen also in the pelvis of *Cebus* and *Hapale* (see pl. 5, fig. 3) and may be traced, although it is much obscured by the still greater expanded ilia, in all anthropoid apes and even in man. Yet Gregory has mentioned this as being one of the main features in *Notharctus* which characterize it as being "essentially lemurine." Also, the anteacetabular spine, which is conspicuous in *Notharctus* and the Madagascar lemurs, was considered a lemurine character; but this element is entirely wanting in the continental lemurs, while it is still a rather prominent feature in some species of *Alouatta*, *Cebus*, and *Hapale*. In fact, the transition from the Notharctine type of pelvis to that of any of the Platyrrhini is so slight as to present no difficulties, especially if obviously modern specializations in the latter are considered. These changes are in each case about what one might expect between an Eocene form and its present day descendants. In contrast with this in the modern lemurs, regardless of what group is considered, the pelvis has not advanced in development beyond, and is still in some respects even more primitive than that of their alleged Eocene ancestors. In view of these facts I can not concede that the *Notharctus* type of pelvis is "essentially lemurine," but believe rather that it stands morphologically between the lemurine and Platyrrhine types with a rather definite trend in development toward the latter.

Thus Gregory had discussed and compared the principal remaining skeletal elements of *Notharctus*, with no better success in establishing his hypothetical case of lemurine affinities of the group represented by this genus than is indicated in the foregoing pages.

In addition to, and perhaps of even more importance than, the evidence just reviewed, there are certain modifications in the skull and dentition of *Notharctus*, also discussed by Gregory and set aside as of but little importance, which seem to me to preclude the possibility of a derivation of any of the modern lemurs from the Notharctine group. I refer here especially to the fusion of the lower jaw symphysis; the modifications of the anterior teeth, which include the normal development and function of the incisors and canines above and below; and the form and position of the lachrymal which lies within the orbital rim. These are all strictly anthropoid and nonlemurine characters, as has been asserted by Wortman and others, and which, moreover, can not be explained away, as Gregory has attempted to do, without ignoring all known facts regarding progressive evolution, and relying on purely hypothetical conjecture. An ununited, or closely sutured lower jaw symphysis is the primitive condition in mammals, and a fused symphysis, in whatever group found, is always considered a specialized condition. To assume therefore that the lemurs, none of whose living representatives have a lower jaw with fused symphysis, could have been derived from an Eocene group in which the symphysis at that early date is either fused or shows an obviously strong tendency to fusion, as in the Adapidae, would be to assume a most improbable reversion of development for which there is not the slightest proof. The reduced lachrymal found in the Adapidae is another feature which can not be considered a primitive character for the Primates, as assumed by Gregory, without again resorting to a supposition of reversion in evolution of characters for which there is not the slightest evidence which might be taken as proof.

As regards the peculiar modifications of the anterior teeth observed in the true lemurs, in which the lower canines have become incisiform, taking a procumbent position with the incisors, and in which one of the premolars has become caniniform, it will again require a vast amount of explaining based on pure conjecture to derive this modification from such a condition as is found in *Notharctus* and *Adapis*. In these genera the lower canine is moderately large and functions normally as a canine, and there is a tendency to reduction rather than enlargement of the anterior premolars.

There still remains to be discussed the two principal skull characters upon which Gregory has seemed to rely in defending his theory for a lemuriform stage of development for *Notharctus*. These are the presence of the postorbital bar and the modifications of the auditory region, both of which are found in *Notharctus* in practically the same stage of development as in the Madagascar lemures. The first of these seems to have little or no weight as a proof of affinity between an ancient Eocene group and living forms, when it is considered that all Primates which finally attain the condition of having the orbit separated from the temporal fossa by a bony partition, as in the living Anthropoidae, must have passed through just this stage at some time during its development. If, therefore, this feature has any significance, it is to the effect that it seems too advanced a stage for any true lemur at so early a geological age, and is about what would be expected in an Eocene anthropoid.

As to the modifications of the auditory region, here again the similarities of *Notharctus* to the Madagascar lemurs, pointed out by Gregory, seem to represent similar stages reached in development, rather than especial relationship. These similarities, consist principally in the presence of a bulla which covers over the petrous portion of the mastoid below and inclosing the tympanic ring; the course and disposition of the internal carotid artery and its principal (stapedial) branch; and the form of the cochlea. First of all, these characters would not apply, as already conceded by Gregory, when comparisons are made with the non-Malagasy lemurs. Therefore it would seem that the most which can be claimed for the possession in common of these characters by *Notharctus* and the Madagascar lemurs is that they are primitive primate characters to be expected in the former, because of the early geologic period, and which have been retained in the latter along with other primitive features. Therefore they can mean little or nothing as determining phyletic relationship.

The presence in *Notharctus* of a bony canal through which the internal carotid artery passes over the ventral surface of the petrosal to enter the brain case, and its relative size compared with the stapedial branch, is, however, an important feature in considering the possible affinity of the Notharctid group with any branch of the Anthropoidea. It would seem to be the primitive condition in the Primates that this artery was relatively small and of less importance in supplying the cerebral hemispheres with blood, and became more important for this function in proportion as the brain increased in size. Thus the relative size of the internal carotid canal is observed to increase and the stapedial branch to decrease, as noted by Wortman[19], from the small-brained to the large-brained forms.

It is, therefore, at least significant, that in the relatively small-brained *Notharctus* of the Eocene, which has the stapedial branch relatively large, the two main branches of the internal carotid are in just the position and condition to be expected in a primitive anthropoid leading from the generalized insectivore type of internal carotid circulation to that of the Platyrrhins and all the modern Anthropoids while among the modern lemurs, only those of the Madagascar group may be considered as being particularly close to the Notharctid stage.

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[19] Amer. Journ. Sci., vol. 15, 1903, p. 163.

It is this condition of the internal carotid circulation in the otic region, and the development of the auditory bulla in connection with its relation to the tympanic ring, which Gregory especially emphasized as indicating peculiarly lemurine affinities of *Notharctus*. Yet his deductions are based almost exclusively on comparison of the Eocene Notharctids with the lemurs of Madagascar, in both of which the tympanic ring is entirely free and covered by the auditory bulla and in which the internal carotid artery in its course to the brain enters and passes through the auditory bulla, the especial "lemurine" feature being that the stapedial branch is larger than the arteria promintorii portion, while in the Anthropoidea, the arteria promintorii is large and the stapedial portion wanting or much diminished.

If only the Malagasy, or Madagascar, lemurs were to be considered, Gregory's presentation would be rather convincing, for there can be no denying the fact that there is a striking similarity between *Notharctus* and this particular group of lemurs in the principal features of the auditory development so far as they can be made out from the bony structure. However, when the continental and other living lemurs of the Old World, including *Tarsius*, on the one hand, and the Platyrrhine monkeys of the New World on the other, are included, this similarity loses much of its significance and, as already intimated, this seems to admit of a different interpretation of relationship than the one advanced by Gregory.

As to the internal carotid arrangement observed in *Notharctus*, therefore, Gregory and I seem to agree as to its being a primitive primate condition, but we disagree regarding its significance.

Another important feature of Gregory's presentation is the similarity in the relation of the annulus to the tympanic bulla observed in *Notharctus* and the lemurs. But here again his comparison is made with the Malagasy group only, and thus loses much of its significance when the other living lemurs are included. In the Madagascar lemurs, as is well known, the annulus is entirely free and is completely hidden from beneath by the expanded bulla which extends well to the outside where it is completely fused with the squamosal, without forming a tubular external auditory meatus. However, in all other lemurs, including *Tarsius*, a tubular external auditory meatus is formed apparently from the outward extention of the annulus, which in turn is fused with the bulla, a condition observed in the Old World monkeys and in man. In the Platyrrhina the annulus is fused with the bulla but the external bony tube is usually not developed. According to

Gregory, the annulus in *Notharctus*, while free, is not so completely covered by the bulla as in the Madagascar lemurs. Thus it would seem that while structurally nearer this group the Notharctid stage of development, after all, takes an intermediate place tending toward the condition observed in the Platyrrhini and away from the true lemur type.

The development of the otic bulla in connection with its relation to the tympanic ring will be more fully discussed in another article now in preparation.

SUMMARY AND CONCLUSIONS.

As a result of the foregoing studies, several important conclusions are suggested, which, though for the most part still lacking positive demonstration, seem at least worthy of serious consideration. For it is only by such methods of comparison and discussion that one may hope ever to attain, or even approximate, the ultimate truth regarding the evolutionary history of animal life of the past as recorded by fossil remains. Especially is this evident when it is considered how very incomplete at best is the story of development in attempting to trace those ancient phyletic series which are based, as they necessarily must be, on the present relatively scanty and broken records. For at best, in our fossil records there exist many wide gaps, which in many cases probably will never actually be filled, although future discoveries in the fossil fields may greatly aid in this matter.

Some of the following conclusions have been advocated and defended in part or in whole by other authors, but in greater part they have been suggested by my own lines of investigation. These conclusions may be thus briefly summarized:

1. The evidence of the Fort Union mammals, as at present known, seems to show conclusively that the major groups at least of the Tarsiidae, as defined by Matthew, had their origin much earlier than the beginning of the Eocene, being almost as well marked in the Paleocene as in the Wasatch and Bridger.

2. The early Tarsiids, as at present understood, seem not to represent a natural group. That is, certain forms, now referred to this group on definition of tooth characters alone, when better known, may lose their present taxonomic arrangement of closely affiliated species.

3. It would seem, however, that within this group are to be found the ancestral stock which gave rise to the living Tarsiers, they being derivable from some such forms as *Omomys* or *Anaptomorphus;* and possibly the origin of the aberrant lemur, *Daubentonia* of Madagascar also may be traced to some other form of this group with the dental modifications of *Phenacolemur*, or *Tetonius*.

4. Probably, also, as indicated by certain modifications noted in the Fort Union *Paromomys* and *Palaechthon*, some of the Eocene Tarsiid, at least, were rather closely related to the Notharctids, as was suggested by Wortman; in which case Wortman's other suggestion of a possible derivation of the marmoset branch of the Platyrrhini from some form of Eocene Tarsiid, as *Omomys*, is not entirely impossible. These conjectures regarding relationships, however, can only be tested by a knowledge of skull and foot structure, which, in most of the early Tarsiids, is at present almost entirely wanting.

5. Neither the Paleocene Primates nor a restudy of the Notharctid group itself seems to lend any support to the views held by Gregory, Stehlen, and others regarding the primitive ancestral-lemurine affinities of the Adapidae. That they have lemurine affinities can not be denied, but these Eocene Primates which were still in a primitive-primate or relatively generalized stage of development, appear to have been progressively advancing along lines leading definitely toward the modern Anthropoidea, especially in the direction of the Platyrrhine group; and that their relationship to the lemurs, though apparently close to one living group, is to be traced backward from the Notharctids to a more remote common ancestor and not forward in geologic time. Or in other words, it may be assumed that the Adapidae represent a group of Primates which, while having been derived from an earlier group also giving rise to the modern lemurs, were as early as the Eocene already definitely progressing away from the lemurine and toward the anthropoid type of development.

6. It logically follows from the foregoing views that none of the now known early Primates fulfill the conditions required of an ancestral type from which the modern lemurs (excepting only the Tarsiidae and possibly the Daubentoniidae) were derived, and this hypothetical group still remains to be discovered. The same may possibly be said of the monkeys and apes of the Old World, at least so far as the Tertiary beds of North America are concerned. But the ancestral stock of these anthropoids, if found in beds of Eocene age, may be expected to show very close affinities with the Notharctinae.

7. The combined evidence of the known Eocene and Paleocene Primates indicate rather clearly that, although still relatively primitive and generalized in anatomical structure, the evolution of the Primates, even at this early time, was well under way, and we must look much further backward in time than to the beginning of the Tertiary for the origin of the principal major groups of this great order.

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EXPLANATION OF PLATES.

PLATE 1.

(All figures about 4 times natural size.)

Page.

FIG. 1. *Palaechthon alticuspis* Gidley. Genus and species new. Genotype. Portion of a right lower jaw. No. 9532 U. S. Nat. Mus. Coll. 6

2. *Paromomys maturus* Gidley, new genus and species. Paratype. Portion of a right lower jaw, outer-side view; 2*a* tooth-crown view. No. 9545 U. S. Nat. Mus. Coll 3

3. *Paromomys maturus* Gidley, new genus and species. Genotype. Portion of a right lower jaw, outer-side view; 3*a*, tooth-crown view. No. 9473 U. S. Nat. Mus. Coll 3

PLATE 2.

(All figures about 4 times natural size.)

1. *Pronothodectes matthewi* Gidley. New genus and species. Paratype. Portion of a left lower jaw, outer-side view. No. 9531, U. S. Nat. Mus. Coll 12

2. *Paromomys maturus* Gidley. Paratype. Portion of a right lower jaw, outer-side view; 2*a* tooth-crown view. No. 9475, U. S. Nat. Mus. Coll 3

3. *Paromomys maturus* Gidley. Paratype. Portion of a left lower jaw, outer-side view. No. 9337 U. S. Nat. Mus. Coll 3

PLATE 3

(All figures about 4 times natural size.)

1. *Nothodectes* cf. *gidleyi* Matthew. A left upper molar No. 10765 U. S. Nat. Mus. Coll. From type locality of Tiffany beds, near Ignacio, Colorado 13

2. *Pronothodectes matthewi* Gidley, new genus and species. Genotype. Portion of a right maxillary carrying 3 cheek teeth, p^{4} to m.^{3} No. 9547 U. S. Nat. Mus. Coll 12

3. *Nothodectes* cf. *gidleyi* Matthew. A right upper premolar, p.^{4} No. 10659 U. S. Nat. Mus. Coll. From type locality of Tiffany beds, near Ignacio, Colorado.

4. cf. *Tetonius rex* Gidley. New species. Type A left lower molar, No. 9828 U. S. Nat. Mus. Coll. From Fort Union beds, "No. 3," about 4,000 feet higher than the Gidley quarry horizon 11

5. *Palaechthon alticuspis* Gidley. Paratype. Portion of a right maxillary carrying the three molars, m^{1} to m.^{3} No. 9550, U. S. Nat. Mus. Coll 6

6. *Palaechton alticuspis* Gidley. Paratype. Fragment of a right maxillary carrying 2 molars, m^{1} and m.^{2} No. 9551, U. S. Nat. Mus. Coll. 6

7. *Paronomys depressidens* Gidley. new species. Type. Portion of a right maxillary carrying 4 cheek teeth, p.^{4} to m.^{3} No. 9546 U. S. Nat. Mus. Coll 4

8. cf. *Pronothodectes*, species. A left upper incisor. No. 10090 U. S. Nat. Mus. Coll 14

9. cf. *Pronothodectes*, species. A right upper incisor, No. 10010 U. S. Nat. Mus. Coll 15

10. cf. *Palaechthon minor* Gidley. A right upper incisor, No. 9928 U. S. Nat. Mus. Coll 14, 15

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FIG. 11. *Pronothodectes* cf. *matthewi* Gidley. A right upper incisor No. 10005 U. S. Nat. Mus. Coll 13

12. *Pronothodectes* cf. *matthewi* Gidley. A left upper incisor, No. 10044 U. S. Nat. Mus. Coll 13

13. cf. *Nothodectes*, species. A right lower incisor No. 9827. From locality "No. 12." Fort Union "No. 3." (Upper Fort Union.) 13

14. *Genus and species undetermined.* A left lower incisor No. 9552 U. S. Nat. Mus. Coll 14

15. *Genus and species undetermined.* A pair of upper incisors. No. 9917 U. S. Nat. Mus. Coll 14

16. *Nothodectes* cf. *gidleyi* Matthew or new species. A left upper incisor No. 10639 U. S. Nat. Mus. Coll. From Tiffany beds 5½ miles east of Bayfield, Colorado.

PLATE 4.

(All figures about 4 times natural size.)

1. *Palaechthon minor* Gidley, new species. Type. Portion of a right lower jaw carrying four cheek teeth, p_4 to m_3 outer-side view; *1a* tooth-crown view. No. 9639 U. S. Nat. Mus. Coll 7

2. *Elphidotarsius florencae* Gidley, new genus and species. Genotype. Portion of a left lower jaw carrying four cheek teeth, p_4 to m_3 outer-side view; *2a* tooth-crown view. No. 9411 U. S. Nat. Mus. Coll.. 10

3. *Pronothodectes matthewi* Gidley, Portion of left lower jaw carrying 7 teeth. p_4 to m_3 outer-side view; *3a* tooth-crown view. No. 9332 U. S. Nat. Mus. Coll 13

PLATE 5.

(Figures no exact scale, comparative ventral views of pelvises.)

1. *Callithrix jacchus* No. 49480 U. S. Nat. Mus. Biol. Coll. Locality not known. Zoological Park specimen 29

2. *Allouatta* cf. *palliata* or *belzubula*. Locality not known. No. 25309 U. S. Nat. Mus. Biol. Coll 29

3. *Cebus* cf. *capucinus*. Panama. No. 805 U. S. Nat. Mus. Biol. Coll. 29

4. *Solenodon cubanus*. Cuba. No. 49508 U. S. Nat. Mus. Biol. Coll.. 29

5. *Dasyurus ursinus*. Australia. No. 22816, U. S. Nat. Mus. Biol. Coll. 29

6. *Perodicticus potto*. Africa. No. 49547, U. S. Nat. Mus. Biol. Coll. 29

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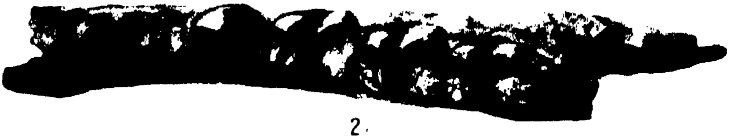

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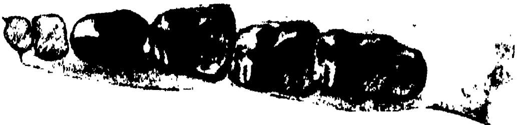

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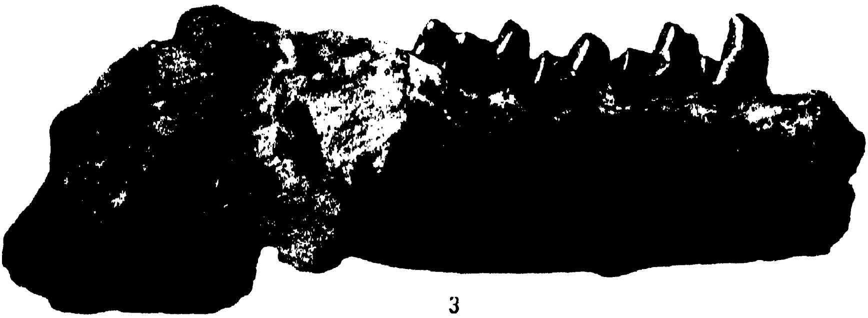

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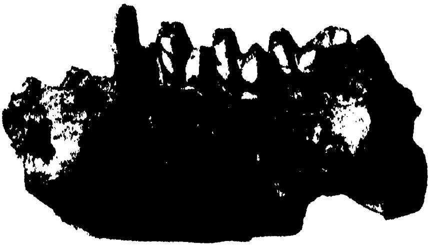
LOWER JAWS OF EARLY PRIMATES

FOR EXPLANATION OF PLATE SEE PAGE 37.



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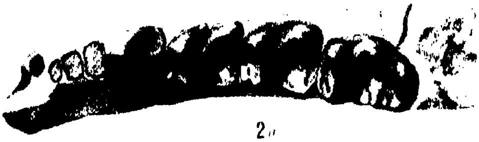

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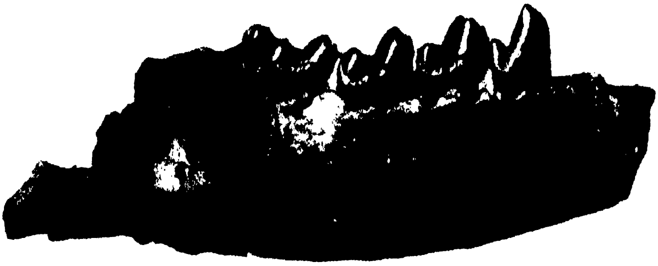

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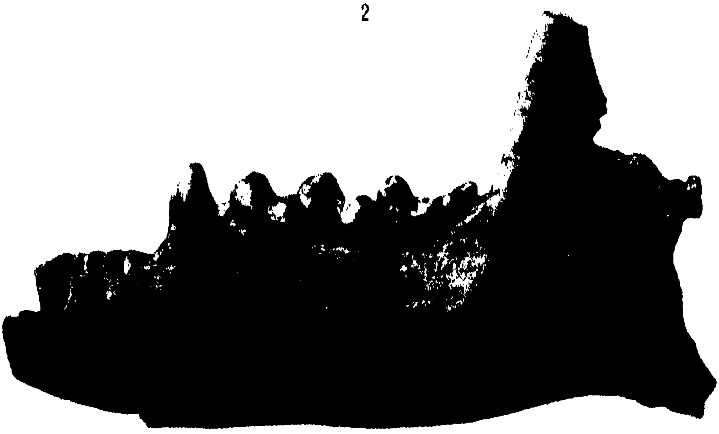

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LOWER JAWS OF EARLY PRIMATES.

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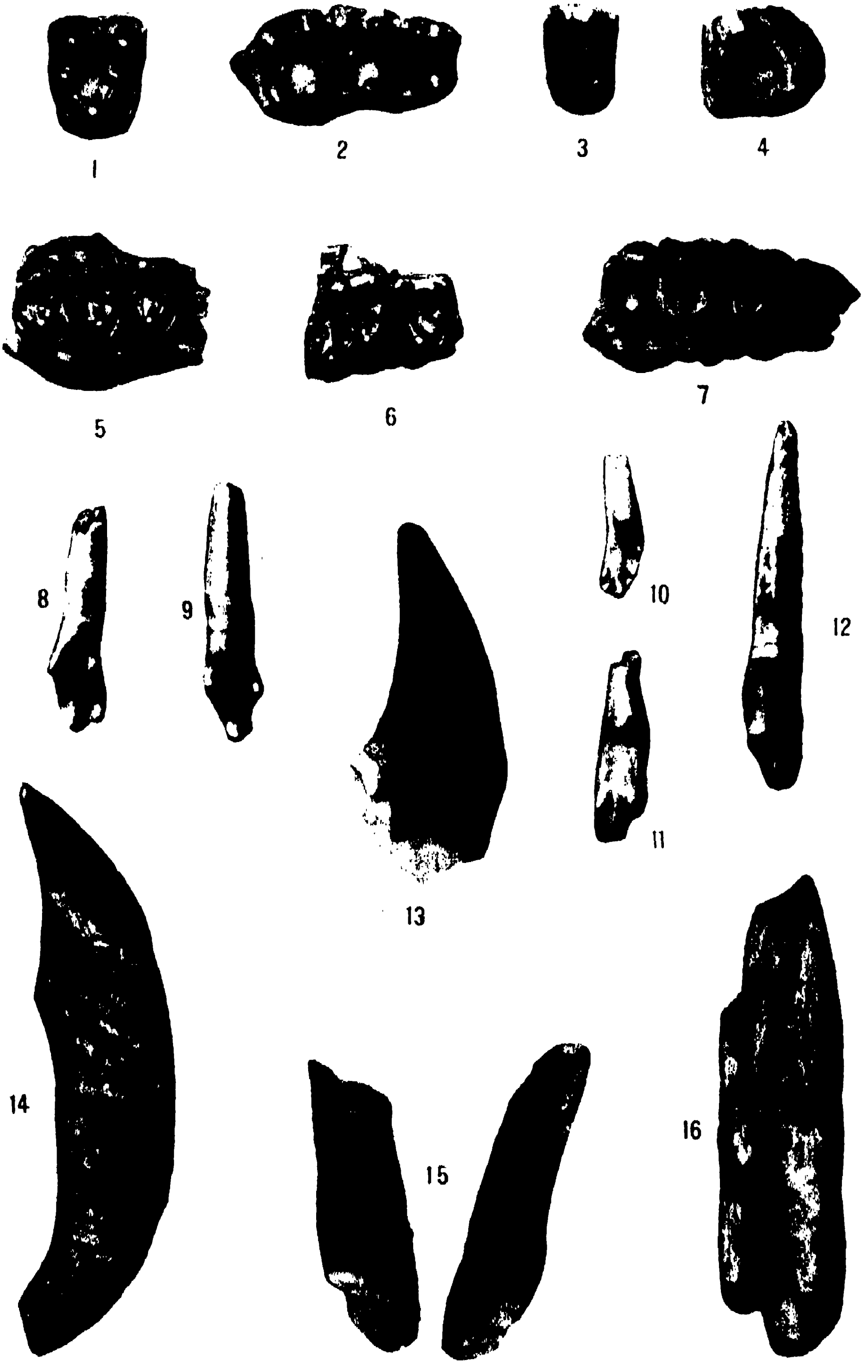
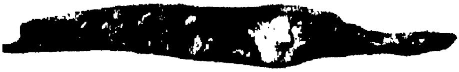


TEETH OF EARLY PRIMATES.

FOR EXPLANATION OF PLATE SEE PAGES 37 AND 38.



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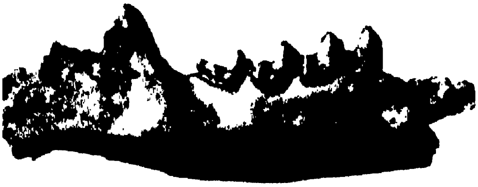

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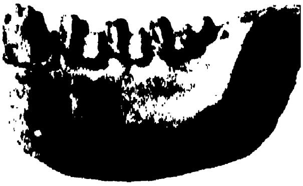

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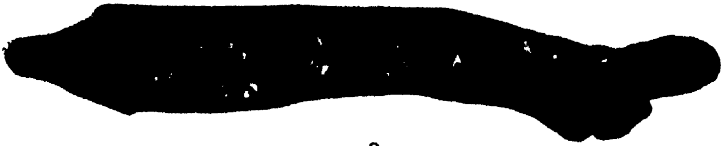

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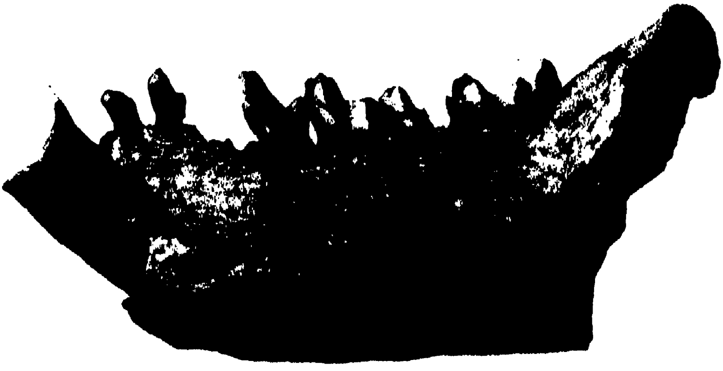

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LOWER JAWS OF EARLY PRIMATES.

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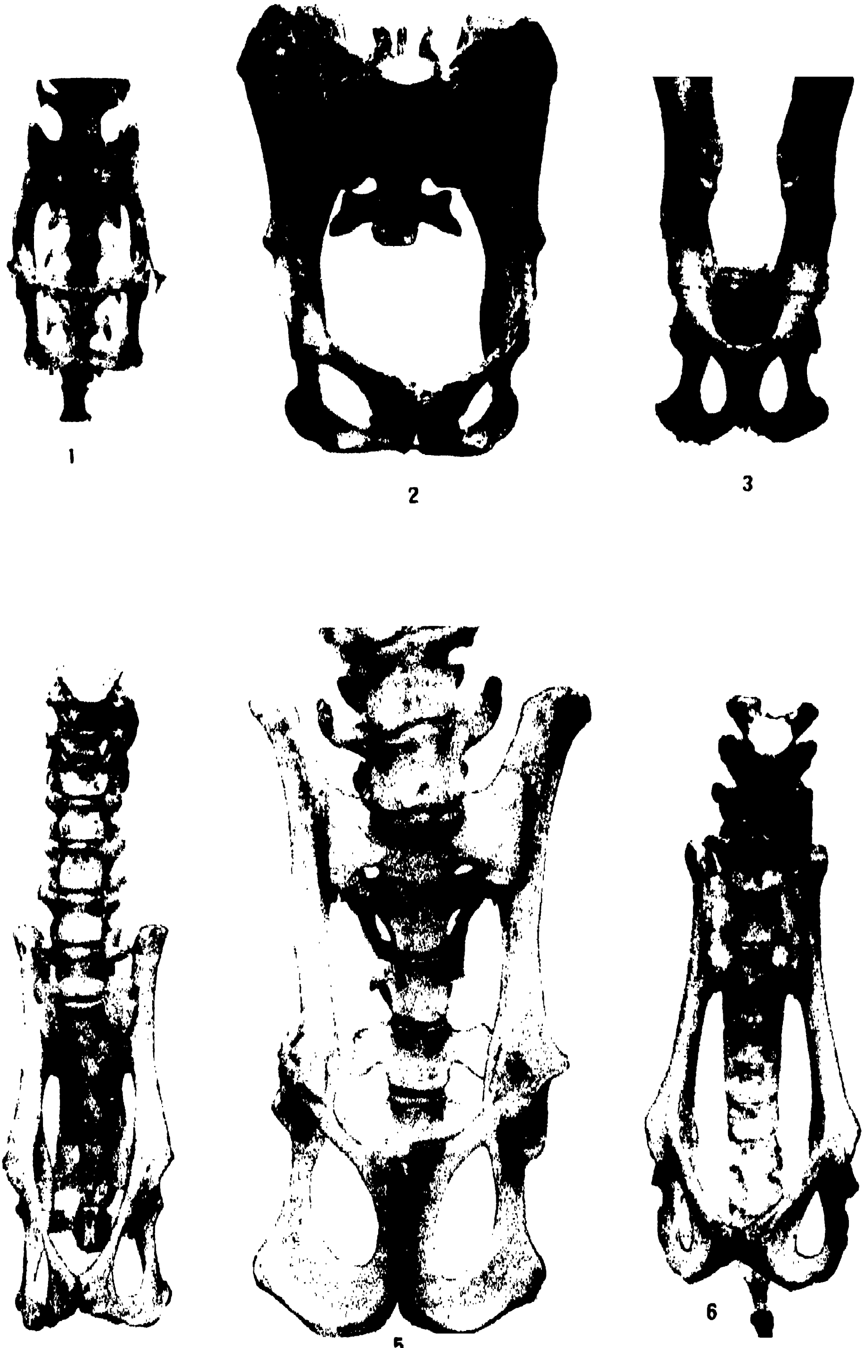

COMPARATIVE SERIES OF PELVES OF MAMMALS.

FOR EXPLANATION OF PLATE SEE PAGE 38.

A REVISION OF THE NORTH AMERICAN SPECIES OF ICHNEUMON-FLIES BELONGING TO THE GENUS METEORUS HALIDAY.

By C. F. W. Muesebeck,

Of the Bureau of Entomology, United States Department of Agriculture.

INTRODUCTION.

In this paper, which is a contribution from the gypsy moth and brown-tail moth division of the Bureau of Entomology, an attempt has been made to define the limits of the braconid genus *Meteorus* Haliday, and to prepare a key which will enable the worker in the parasitic Hymenoptera to identify the North American species of this group. Incidentally it was found necessary to describe a number of new species, several of which appear to be common.

The task of revising the genus was undertaken because the group is an important one economically and at the same time has been badly confused. Owing to the extreme variability of the species, erroneous determinations have been many; and host records that have been published are, in considerable part, incorrect. Fortunately, the collection in the United States National Museum, at Washington, District of Columbia, upon which this work is largely based, has extensive reared series of most species; and a good deal of additional material reared at the gypsy-moth laboratory at Melrose Highlands, Massachusetts, was also available. This has helped immeasurably in the selection of characters which will be found useful for the separation of species.

The types of most of our species are in the collections of the United States National Museum and the Philadelphia Academy of Sciences. To these and the types of the three species in the Connecticut Agricultural Experiment Station, in New Haven, Connecticut, I have had access. I have had no opportunity, however, of studying the following: The types of Provancher's species, which are in the Museum of Public Instruction, in Quebec, Canada; those of three of Viereck's species which are in the collection of Kansas University; that of *bakeri* Cook and Davis, which appears to have been lost; that of *vitticollis* Holmgren, which was evidently placed in a European collection; and that of the European species, *versicolor* Wesmael, a parasite of the brown-tail moth, now well established in the New England States. In placing the Provancher and Viereck species just alluded to, I received valuable aid from notes made by Mr. A. B. Gahan upon a study of the types a few years ago and kindly loaned me for use in the preparation of this paper. The original description of *bakeri* is good, and this together with the authors' figure and the host record makes identification of this species comparatively easy; *vitticollis* Holmgren was poorly characterized, and I have been unable to place it; accordingly it has been omitted from the table of species. A large amount of authentic material of *M. versicolor*, in the collection of the gypsy-moth laboratory in Melrose Highlands, Massachusetts, has been studied, and used in assigning this species to its proper place in the key. Thirty-one valid species, besides *vitticollis*, are recognized as occurring in our fauna; of these 13 are new to science and are described in the following pages. It has been necessary to suppress 17 names as synonyms of previously described species; this is not surprising in view of the enormous extent of the variation found in nearly all forms.

I am indebted to Mr. A. F. Burgess, in charge of the gypsy-moth and brown-tail moth investigations, for permission to make the trips necessary for an examination of the type material; and to Messrs. A. B. Gahan and S. A. Rohwer, of the Bureau of Entomology, for many helpful suggestions and for criticism of the manuscript. Thanks are due Dr. J. C. Bradley, of Cornell University, for the loan of all the *Meteorus* material in that institution; also Mr. C. W. Johnson, of the Boston Society of Natural History; Mr. Nathan Banks, of the Museum of Comparative Zoology in Cambridge, Massachusetts, and Dr. C. T. Brues, of Harvard University, for the loan of specimens. Prof. R. H. Pettit, of the Michigan Agricultural Experiment Station, very kindly sent me a specimen which was supposedly the type of *bakeri* Cook and Davis, but which, it was found later, had not been included in the type series, the original series of three specimens having apparently disappeared.

CLASSIFICATION.

Superfamily ICHNEUMONOIDEA.

Family BRACONIDAE.

Subfamily METEORINAE.

Genus METEORUS.

Meteorus HALIDAY, Entom. Mag., vol. 3, 1835, p. 24. Genotype.—*Meteorus filator* Haliday. (By designation of Viereck, Proc. U. S. Nat. Mus., vol. 39, 1911, p. 401.)

Protelus FOERSTER, Verh. naturh. Ver. pr. Rheinl., vol. 19, 1862, p. 253. Genotype.—*Perilitus chrysophthalmus* Nees (Monobasic).

Zemiotes FOERSTER, Verh. naturh. Ver. pr. Rheinl., vol. 19, 1862, p. 253. Genotype.—(*Perilitus albitarsis* Nees) = *Meteorus albiditarsis* (Curtis) (Monobasic).

Perilitus FOERSTER (not Nees), Verh. naturh. Ver. pr. Rheinl., vol. 19, 1862. p. 253. Genotype.—*Perilitus pallidus* Nees (Monobasic).

Saprotichus HOLMGREN, Eug. Resa Zool. Ins., 1868, p. 430. Genotype.—*Saprotichus chinensis* Holmgren. (By designation of Viereck, Bull. U. S. Nat. Mus., 83, 1911, p. 130).

Head transverse, at least as broad as thorax; maxillary palpi 6-segmented; labial 3-segmented; mandibles bidentate, fitting closely against clypeus; clypeus well defined, separated from the face by an impressed line; antennae slender, varying in number of segments from about 20 to about 50, the number not constant within the species, but ranging within rather narrow limits; eyes moderate to large, always sparsely pubescent; ocelli extremely variable in size, but fairly constant within the species; occiput temples, cheeks, margined; prepectus marked off by a distinct carina; mesonotum with parapsidal grooves, these usually ending in a rather large, slightly sunken, roughened area posteriorly; disk of scutellum more or less convex; propodeum not regularly areolated, usually rugoso-reticulate, but sometimes with four rather well-defined areas on dorsal face; legs slender; inner spur of posterior tibiae never more than half as long as metatarsus, usually much shorter; anterior wings with three cubital cells, the second complete and subtrapezoidal, narrowed toward radius, and usually oblique; first cubital cell always separated from first discoidal, radius made up of three abscissae, the first two short, occasionally of equal length, but the first usually shorter than second; radial cell moderate to large; recurrent vein interstitial with first intercubitus, or entering either first or second cubital cells near first intercubitus; nervulus variable, but usually somewhat postfurcal; posterior wing with a long narrow radiellan cell, which usually narrows slightly toward apex, but in a few species (genus *Zemiotes* of Foerster) distinctly broadens apically, and then is divided by an indistinct transverse nervure before middle, or is at least somewhat constricted at this point; nervellus straight, not branched; lower abscissa of basella never parallel with subcostella and never on a line with the mediella; abdomen ovate or lanceolate, and petiolate, very rarely subpetiolate; spiracles of first segment placed at or very near the middle, more often a little behind than before; first tergite usually sculptured, and in some species provided with two conspicuous fossae (called "tracheal grooves" by Marshall) anterior to the spiracles; remainder of abdomen smooth and polished; segments two and three connate, and longer and broader than the following; hypopygium not prominent; ovipositor sheaths varying in length from slightly less than half as long as the abdomen to longer than the entire body.

The genus *Meteorus* as here considered constitutes the subfamily *Meteorinae* as that is understood at the present time. Szepligeti[1] recognized *Zemiotes* Foerster as a good genus, distinguished from *Meteorus* by the broadening, divided radiellan cell; but while this character is conspicuous, it does not appear to be of more than specific or possibly subgeneric value in this group. The five known North American species of Meteorinae possessing a broadening divided radiellan cell, are included in this paper as species of *Meteorus*. *Saprotichus* Holmgren was suppressed as a synonym of *Meteorus* Haliday by Szepligeti,[2] and this opinion has been supported by Dr. A. Roman.[3] There can be no doubt that this view is correct. *Perilitus* Foerster (not Nees) and *Protelus* Foerster were originally separated from *Meteorus* on characters which are absolutely valueless in this group from a generic standpoint, and of little importance even specifically. Szepligeti correctly placed these in the synonymy of *Meteorus*. *Aridelus* Marshall, which was included in the *Meteorinae* by Ashmead,[4] has been referred to the *Euphorinae* by Szepligeti, where it apparently belongs. The open second cubital cell, the short radial cell, the confluence of the first discoidal and the first cubital cells, and the habitus (which is that of *Wesmaelia* Foerster), certainly ally this genus more closely to genera in the *Euphorinae* than to *Meteorus*. It must be conceded, however, that *Meteorus* alone does not form a natural group as distinct from the *Euphorinae;* and it is only provisionally that it is retained here as a separate subfamily.

Little difficulty should be encountered in distinguishing between species of *Meteorus* and related groups, if the important points in the foregoing detailed generic characterization are borne in mind. The wing venation and the petiolate abdomen will separate members of this genus from any other group with which they can possibly be confused.

Our knowledge of the habits and biology of the species of this genus is rather meager, being limited to a few of the economically more important forms. It appears that most of our known species are internal parasites of lepidopterous larvae; but a few are said to attack the larvae of fungivorous Coleoptera. This rather marked variation in habit has been noted among the European species of *Meteorus* also, species like *obfuscator* Nees, *profligator* Haliday, and *filator* Haliday having been mentioned as parasites of fungivorous beetle larvae.[5] There is not sufficient correlation between this habit and structural characters, however, to permit the separation of the parasites of Coleoptera from those attacking Lepidoptera as distinct taxonomic groups. Furthermore, I believe more exact rearing data are necessary before we can entirely accept the records from beetle larvae. It is quite possible that in some instances at least lepidopterous, and not coleopterous, fungivorous larvae were the hosts. One of our species, *humilis* Cresson, has been recorded from *Orchesia*, and also from *Tinea*, indicating, if the records are correct, that no discrimination is made between lepidopterous and coleopterous larvae, providing only that both are working in fungus.

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[1] Gen. Ins., fasc. 22, 1904, p. 177.

Idem, p. 177.

[3] Ent. Tids., vol. 31, 1910, p. 182.

Proc. U. S. Nat. Mus., vol. 23, 1900, p. 117

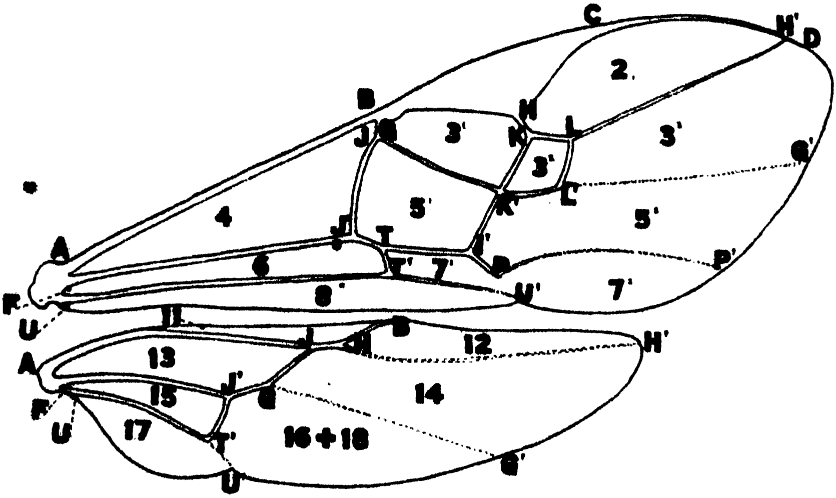

Fig. 1.—Wings of Meteorus hyphantriae Riley. Veins.—Anterior wing: AB—costa; BC—stigma; CH'D—metacarpus; HKH'—radius; GK'G'—cubitus; FJ'—medius; J'I'P—discoideus; PP'—subdiscoideus; UT'—submedius; T'U'—brachius; JJ'—basal vein; KK'—1st intercubitus; LL'—2d intercubitus; K'I'—recurrent vein; TT'—nervulus. Posterior wing: AJB—subcostella; HH'—radiella; GG'—cubitella; FJ'—mediella; UT'—submediella; T'U'—brachiella; JG—upper abscissa of basella; GJ'—lower abscissa of basella; J'T'—nervellus. Cells.—2—radial cell; 3—cubital cells; 4—median cell; 5—discoidal cells; 6—submedian cell; 7—brachial cells; 8—anal cell; 11—costellan cell; 12—radiellan cell; 13—mediellan cell; 14—cubitellan cell; 15—submediellan cell; 16+18—discoidellan+brachiellan cells; 17—anellan cell. The lettering and numbering used are those employed by Rohwer and Gahan in their Horismology of the Hymenopterous Wing, Proc. Ent. Soc. Wash., vol. 18, 1916, pp. 20-76.

The full-grown larvae of most of our species of *Meteorus* make characteristic pensile cocoons, often found hanging from limbs or the smaller twigs of trees. The fine suspending thread is usually several inches, not uncommonly 8 to 10 inches, in length. It may be that this suspension of the cocoons provides a certain degree of protection against secondary parasites; still, I have always reared hyperparasites in abundance from field-collected cocoons of species of *Meteorus*.

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[5] Ratzeburg, Ichn. d. Forstinsect., vol. 2, 1848, p. 55, and vol. 3, 1852, p. 59; Marshall, Trans. Lond. Ent. Soc., 1887, pp. 105, 121, 123.

In the following key, as also in the descriptions and discussions of the various species, frequent reference is made to wing characters. I have employed throughout this paper the terminology adopted by Rohwer and Gahan in their "Horismology of the Hymenopterous Wing."[6] The explanation of the wing figure included in the present paper will prevent any possible misunderstanding regarding the meaning of the terms used. Much care has been taken in the selection of characters employed in the key; yet, so wide is the variation occurring in nearly all species that identification of specimens representing the extremes of their respective species will possibly occasion some difficulty. The presence or absence of the dorsal fossae on the petiole is easily determined and this character serves to divide the genus into two rather well-marked groups. The five species which are taken out at the beginning of the key because they possess a broadening divided radiellan cell, are also provided with a pair of dorsal fossae on the petiole, and are most closely allied to *communis*. The degree

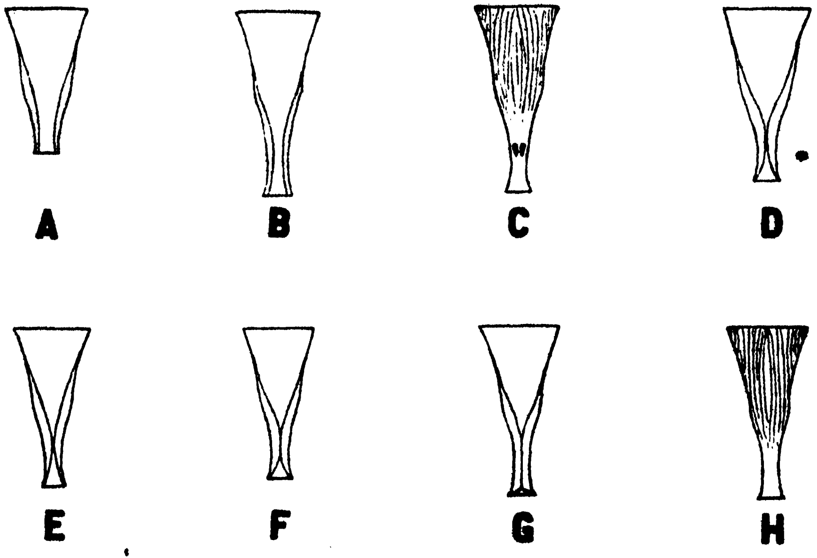

FIG. 2.—A—VENTER, FIRST ABDOMINAL SEGMENT OF M. TIBIALIS, SHOWING VENTRAL MARGINS OF THE TERGITE. B—VENTER, FIRST ABDOMINAL SEGMENT OF M. COMMUNIS. C—DORSUM, FIRST ABDOMINAL SEGMENT OF M. COMMUNIS, SHOWING THE PAIR OF FOSSAE ON PETIOLE. D—VENTER, FIRST ABDOMINAL SEGMENT OF M. INDAGATOR. E—VENTER, FIRST ABDOMINAL SEGMENT OF M. DIMIDIATUS. F—VENTER, FIRST ABDOMINAL SEGMENT OF M. VULGARIS. G—VENTER, FIRST ABDOMINAL SEGMENT OF M. HYPHANTRIAE. H—DORSUM, FIRST ABDOMINAL SEGMENT OF M. HYPHANTRIAE, SHOWING ABSENCE OF FOSSAE ON PETIOLE.

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[6] Proc. Ent. Soc. Wash., vol. 18, 1916, pp. 20-76.

of approximation of the ventral margins of the first abdominal tergite (several types of which are illustrated) is relatively very constant and will be found extremely helpful in identifying specimens of this genus. Other useful characters are found in the wings; while there is always more or less variation here, as used in the key these characters will probably be found good. There is some variation within species in the size of the ocelli; those of the males are as a rule a little smaller than in the female, and even in the same sex slight variations occur; yet, considerable reliance can be placed upon this character, as also upon the length of the malar space. The number of antennal segments varies within quite definite limits, and to a certain extent is dependable for the separation of species. In the case of the females the length of the ovipositor sheaths helps greatly in making identifications. Color and sculptural characters are the most variable of all, and must be used with much care, but where they have been employed in the following key they are apparently of considerable value.

KEY TO THE NORTH AMERICAN SPECIES OF METEORUS.

1. Radiellan cell distinctly broadening toward apex and divided by an indistinct cross-vein; second abscissa of radius usually longer than second intercubitus..2
   Radiellan cell narrowing or at least not broadening, toward apex and with no indication of a cross-vein; second abscissa of radius never longer, usually shorter, than second intercubitus..................................6
2. Mesopleura entirely smooth and polished; antennae with about 30 segments; posterior tarsi brownish..............................1. levis, new species.
   Mesopleura closely punctate or finely rugulose on lower half; antennae with 37–50 segments..3
3. Ovipositor sheaths nearly as long as the abdomen; body color deep ferruginous, the thorax, especially in the sutures, and often base and apex of abdomen, tinged with blackish; antennae brown, except scape beneath; posterior tibiae black on apical half; posterior tarsi white; nervellus decidedly longer than lower abscissa of basella..........................2. niveitarsis (Cresson).
   Ovipositor sheaths only half as long as the abdomen; otherwise not agreeing with all the above characters..4
4. Lower abscissa of basella about equal to nervellus; ocell-ocular line a little longer than greatest diameter of an ocellus; antennae testaceous; posterior tarsi pale yellow or whitish.................................3. pallitarsis (Cresson).
   Lower abscissa of basella much shorter than nervellus; ocell-ocular line no longer than diameter of an ocellus; antennae and tarsi variable....................5
5. Length about 10 mm.; antennae with 43–47 segments; posterior tarsi whitish ....4. maximus, new species.
   Length 5–6 mm.; antennae with 38–42 segments; all tarsi testaceous or fuscous ....5. reticulatus, new species.
6. Petiole of abdomen with two deep fossae dorsally anterior to the spiracles; ventral margins of first abdominal tergite usually widely separated, at most barely touching and then diverging again; mesonotal lobes prominent and sharply defined..7
   Petiole of abdomen without fossae dorsally; ventral margins of first abdominal tergite meeting, although sometimes for only a short distance; mesonotal lobes often not so well defined..19

7. Ocelli very small, the greatest diameter of a lateral ocellus only half, or less than half, the length of the ocell-ocular line, very rarely a little larger, and then radial cell exceptionally long, the radius going to extreme apex of wing, and the first abscissa of radius about equal to second........................10

Ocelli larger, the ocell-ocular line not nearly twice as long as diameter of an ocellus; radius always reaching margin much before extreme apex of wing....8

8. Pro- and mesopleura mostly smooth and shining, the latter with a longitudinal crenulate furrow; the ventral margins of first abdominal tergite widely separated; the venter of petiole at base rather coarsely roughened; second abscissa of radius usually nearly as long as the second intercubitus; ovipositor sheaths about half as long as the abdomen; stigma, in female, wholly pale yellow, in the male usually brown; antennae with 33–36 segments....6. **communis** (Cresson).

Propleura closely, finely rugulose, and not so shining; ventral margins of first abdominal tergite not so widely separated, sometimes meeting; venter of petiole at base not so coarsely roughened, usually very smooth; ovipositor sheaths about two-thirds as long as the abdomen or longer; stigma, in both sexes, brown except along anterior margin; antennae of females with 29–32 segments, of males with 29–35 segments..9

9. Posterior declivity of propodeum rather abrupt and distinctly hollowed out medially; eyes very large, the face narrow, the malar space exceedingly short; second abscissa of radius usually but little longer than first abscissa and only half as long as first intercubitus; ovipositor sheaths three-fourths as long as the abdomen; male antennae with 29–32 segments...........7. **indagator** (Riley).

Posterior declivity of propodeum not so abrupt nor so conspicuously hollowed out medially; face broader, at least as broad at base of clypeus as long between insertion of antennae and base of clypeus; second abscissa of radius usually about twice as long as the first, and distinctly more than half as long as first intercubitus; ovipositor sheaths two-thirds as long as the abdomen; male antennae with 33–35 segments...................................8. **loxostegei** Viereck.

10. Wings distinctly a little infumated; lower abscissa of basella usually longer than nervellus...11

Wings hyaline, occasionally with a faint yellowish tint; lower abscissa of basella very rarely longer than nervellus.......................................14

11. Thorax usually stout; first abdominal tergite with rather coarse striae and strongly shining; first discoidal cell petiolate, the petiole unusually long, longer than first abscissa of radius; ovipositor sheaths two-thirds as long as the abdomen ....9. **politus** (Provancher).

Thorax very slender; first abdominal tergite finely closely ruguloso-striate or punctato-striate and opaque; petiole of first discoidal cell much shorter; ovipositor sheaths at least three-fourths as long as the abdomen; abdomen very slender..12

12. First abscissa of radius only one-third as long as second; recurrent vein interstitial with first intercubitus; petiolar fossae very small; ovipositor sheaths a little longer than the abdomen; a very small species, less than 3 mm. in length ....10. **provancheri** Dalla Torre.

First abscissa of radius at least half as long as second; recurrent vein entering first cubital cell; petiolar fossae rather large; ovipositor sheaths never longer, usually distinctly a little shorter, than the abdomen......................13

13. Lower abscissa of basella decidedly longer than upper abscissa and at least one and one-half times as long as nervellus; vertex of head and mesonotal lobes finely shallowly punctate; the very large eyes of the female strongly convergent, the face very narrow, narrower at base of clypeus than long between insertion of antennae and base of clypeus......11. **angustipennis** new species.

Lower abscissa of basella shorter than upper abscissa and very little longer than nervellus; vertex and mesonotal lobes polished; face of female not so narrow, distinctly broader at base of clypeus than long between insertion of antennae and base of clypeus..........................12. **fumipennis**, new species.

14. Posterior coxae somewhat roughened and opaque on outer face; second abscissa of radius about twice as long as first; malar space a little shorter than basal width of mandibles; female antennae about as long as head and thorax united with 23-26 segments; ovipositor sheaths slightly longer than abdomen.
13. **humilis** (Cresson).

Posterior coxae smooth and polished, rarely weakly punctate near base and then not combining all the above characters....15

15. Antennae slender and composed of 33-37 segments, very rarely with only 31 or 32; first flagellar segment a little shorter than second; posterior tibiae brown or blackish, except at extreme base and sometimes along upper margin; ovipositor sheaths slightly longer than body, where female is known....16

Antennae and posterior tibiae not as above; ovipositor sheaths either longer than the entire body or shorter than abdomen....17

16. Face smooth, practically without sculpture; first tergite irregularly wrinkled before apex, the spiracles prominent; second tergite black; stigma uniformly brown....14. **alaskensis** (Ashmead)

Face coarsely coriaceous or finely rugulose; first tergite with complete, strong striae; second tergite ferruginous; base of stigma pale..15. **tibialis**, new species.

17. Malar space in both sexes at least as long as basal width of the unusually broad mandibles; second abscissa of radius about twice as long as first; ovipositor sheaths somewhat longer than the entire body....16. **terebratus**, new species.

Malar space not as long as basal width of the more normal mandibles; second abscissa of radius much less than twice as long as first; ovipositor sheaths a little shorter than abdomen....18

18. Ocell-ocular line two and one-half times as long as greatest diameter of an ocellus; first abscissa of radius shorter than second; female antennae much shorter than the body, with 23-25 segments, those beyond middle as broad as long.
17. **hicoriae**, new species.

Ocell-ocular line usually not distinctly twice as long as greatest diameter of an ocellus; first abscissa of radius usually as long as second; antennae of both sexes about as long as the body, and with 30-34 segments..18. **trachynotus** Viereck.

19. Ocell-ocular line three times, or nearly, as long as the greatest diameter of an ocellus; head large; clypeus unusually large and flat; abdominal petiole very slender; the ventral margins of the first tergite joined for half the length of the segment; female antennae bright yellow, blackish at apex, 22-24 segmented; male antennae fuscous, more slender, 29-31 segmented; ovipositor sheaths about as long as the abdomen....19. **tauricornis** (Provancher).

Ocell-ocular line rarely twice as long as greatest diameter of an ocellus; clypeus normal, convex; female antennae longer; ovipositor sheaths never as long as the abdomen....20

20. Ventral margins of first abdominal tergite meeting at base of petiole and touching for nearly half the length of the segment; ocelli large, the ocell-ocular line very rarely one and one-half times as long as the diameter of an ocellus; petiole, at least basally, always pale, the postpetiole usually more or less black....24

Ventral margins of first tergite meeting considerably beyond extreme base of petiole, and at most joined for only a short distance; ocelli smaller, the ocell-ocular line usually one and one-half to two times as long as the diameter of an ocellus; first tergite uniformly black or brown, very rarely entirely yellowish..21

21. Stigma brown, pale at base and apex or along anterior margin....22

Stigma uniformly pale yellow, transparent....23

22. Wings usually subhyaline or somewhat fuliginous; recurrent vein sometimes entering second cubital cell at extreme base, but often interstitial with first intercubitus; lower abscissa of basella nearly always a little longer than either nervellus or upper abscissa of basella; ovipositor sheaths about two-thirds as long as the abdomen..............................20. **dimidiatus** (Cresson).

Wings perfectly clear hyaline; recurrent vein always distinctly entering second cubital cell; lower abscissa of basella not distinctly longer than nervellus or upper abscissa of basella; ovipositor sheaths about half as long as abdomen.
21. **bakeri** Cook and Davis.

23. Recurrent vein entering second cubital cell; antennae with 33-35 segments, very rarely with 32 or 36; mesonotal lobes polished, not distinctly punctate.
22. **autographae**, new species.

Recurrent vein interstitial with first intercubitus; antennae with 26-32 segments; mesonotal lobes closely shallowly punctate, not polished..23. **vulgaris** (Cresson)

24. Propleura, except along upper margin, wholly coarsely rugulose or rugulosopunctate and not strongly shining; propectus roughened; propodeum evenly rugoso-reticulate, usually without prominent carinae, but with posterior declivity hollowed out medially; first tergite usually mostly smooth, the striae very fine and strongly convergent posteriorly..............................25

Propleura not so completely rugulose, shining; otherwise not combining the above characters..............................27

25. Body color usually ferruginous; wings often subhyaline or faintly tinted with brownish; male antennae fuscous; first abscissa of radius much shorter than second, the latter distinctly more than half as long as first intercubitus; malar space as long as basal width of mandible; ocell-ocular line distinctly longer than greatest diameter of an ocellus..............................26

Body color pale testaceous; wings hyaline; antennae of both sexes pale; first abscissa of radius nearly as long as second, the latter about half as long as first intercubitus; malar space shorter than basal width of mandible.
24. **laphygmae** Viereck.

26. Female antennae 33-35 segmented; male antennae 34-37 segmented; recurrent vein always entering first cubital cell near apex; intercubital veins usually almost parallel; nervellus about equal to lower abscissa of basella.
25. **proximus** (Cresson).

Female antennae 28-31 segmented; male antennae with 32-35 segments; recurrent vein usually interstitial with first intercubitus; intercubital veins not so nearly parallel; nervellus always longer than lower abscissa of basella.
26. **arizonensis**, new species.

27. Head flat behind, descending vertically behind lateral ocelli; occipital carina very poorly defined medially, sometimes incomplete; first abscissa of radius as long as the second; recurrent vein entering second cubital cell; propodeum short, the posterior declivity abrupt; propodeum, apex of posterior coxae below, and the discal trochanters below, black or brown.
27. **acronyctae**, new species.

Head not so flat behind; occipital carina strong, complete; first abscissa of radius rarely as long as second; propodeum normal..............................28

28. Recurrent vein entering first cubital cell; antennae with 27-30 segments, rarely 31 in the male..............................28. **versicolor** (Wesmael).

Recurrent vein nearly always interstitial with first intercubitus or indistinctly entering extreme base of second cubital cell; antennae with 32-38 segments, rarely 31 in female..............................29

29. Nervellus nearly twice as long as lower abscissa of basella; scutellum more than usually convex; last segment of maxillary palpi a little longer than the preceding segment.............................29. **euschausiae**, new species.
Nervellus not nearly twice as long as lower abscissa of basella; scutellum not so strongly convex; last segment of maxillary palpi not distinctly longer than the preceding segment..30
30. Malar space in female as long as basal width of mandible; face a little broader than long between lower margin of antennal foramina and base of clypeus; ocell-ocular line slightly longer than diameter of an ocellus; first abdominal segment stout, the postpetiole unusually broad; ovipositor sheaths hardly half as long as the abdomen....................30. **datanae**, new species.
Malar space in female much shorter than basal width of mandibles; face at least as long as broad; ocell-ocular line usually as long as diameter of an ocellus; postpetiole normal; ovipositor sheaths usually two-thirds as long as the abdomen.
31. **hyphantriae** Riley.

1. METEORUS LEVIS, new species.

Differs from our other species that possess a broadening and divided radiellan cell in its smaller size, in the shorter antennae, and in the unusually smooth pleura.

Female.—Length 4.5 mm. Head transverse; face much broader than long between lower margin of antennal foramina and base of clypeus, smooth and polished; malar space a little more than half as long as basal width of mandible; eyes large, with sparse, exceedingly short, indistinct pubescence; antennae 30-segmented, the first flagellar segment a little longer than second; ocell-ocular line very slightly longer than greatest diameter of an ocellus; mesonotal lobes practically impunctate, polished; parapsidal furrows well marked, but very fine and shallow; scutellum nearly flat, polished; propodeum mostly smooth and shining, with a fine irregular transverse carina near base, two sublateral carinae, and a median longitudinal carina on apical third; propleura very weakly punctate, strongly shining; mesopleura and metapleura smooth and polished; wings rather large; radial cell ending somewhat before apex of wing; first abscissa of radius about half as long as second, the latter nearly or quite as long as second intercubitus; recurrent vein interstitial with first intercubitus; radiellan cell distinctly broadening toward apex of wing, with a suggestion of a transverse division somewhat before middle; lower abscissa of basella at least as long as nervellus, but shorter than the upper abscissa of basella; legs very slender; spurs of posterior tibiae of equal length and nearly one-third as long as the metatarsus; abdomen a little longer than thorax; first abdominal segment as long as the remaining segments united, finely striate and provided with two dorsal fossae on the petiole anterior to the rather prominent spiracles, which are in the middle of the segment; ovipositor sheaths not distinctly half as long as the abdomen. Body color ferrugino-testaceous; scape of antennae concolorous with face; pedicel and flagellum slightly darker, the latter becoming dusky at apex;

legs testaceous, posterior tibiae and tarsi pale brownish; wings clear hyaline, stigma testaceous; first abdominal segment somewhat tinged with blackish at base.

Type locality.—Jemez Springs, New Mexico.

Type.—In the Cornell University collection.

Described from a single female specimen collected by John Woodgate, September 5, 1913.

2. METEORUS NIVEITARSIS (Cresson).

Perilitus niveitarsis CRESSON, Canad. Entom., vol. 4, 1872, p. 81.
Meteorus niveitarsis Cresson, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Type.—In the Philadelphia Academy of Sciences.

The female of this species can be distinguished at once from our other species, which have a broadening radiellan cell, by its much longer ovipositor sheaths, which very nearly equal the length of the abdomen. The male is not so easily separated by structural characters; but the blackish markings in the thoracic sutures and usually at base and apex of abdomen, the black apical half or third of posterior tibiae, which contrasts strikingly with the pure white posterior tarsi, in conjunction with a nervellus longer than the lower abscissa of basella, will probably distinguish males of this species from those of closely related species. The antennae of the unique type are 40-segmented; other specimens show a range from 38 to 43 segments. In the female the ocell-ocular line is a little shorter, while in the males examined it is slightly longer, than the diameter of a lateral ocellus.

Distribution.—Massachusetts, Maine, Canada.

Host.—Unknown.

The above notes are based on the following material: The type and three additional specimens, all from Massachusetts, in the collection of the Philadelphia Academy of Sciences; one female from Ottawa, Canada, in the United States National Museum; four males, taken at Eastport, Maine, and one from Capens, Maine, which are in the collection of Dr. C. T. Brues, of Harvard University; and one male, from Eastport, Maine, in the collection of the Boston Society of Natural History.

3. METEORUS PALLITARSIS (Cresson).

Perilitus pallitarsis CRESSON, Canad. Entom., vol. 4, 1872, p. 80.
Meteorus pallitarsis Cresson, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Type.—In the Philadelphia Academy of Sciences.

This species is rather easily distinguished from related species by the characters noted in the key. In color it is uniformly testaceous; the stigma in female pale yellow, in male light brown; malar space in male is distinctly more than half as long as basal width of mandible, in female much shorter; in all the specimens seen the lower abscissa of basella is about equal to nervellus, and also subequal with upper abscissa of basella; in size the species agrees with *niveitarsis*, being about 6 mm. in length.

Distribution.—New Jersey, Pennsylvania, Rhode Island, Massachusetts, New Hampshire, Vermont.

Host.—Unknown.

The foregoing discussion is based on the following specimens: The type, which is a male from New Jersey; two other males in the Philadelphia Academy of Sciences, with no locality data; five specimens, representing both sexes, in the collection of the Boston Society of Natural History, four of these having been taken at Mount Equinox, Vermont, and one at Chester, Massachusetts, by Mr. C. W. Johnson; one female from Ridgewood, New Jersey, in the Cornell University collection; five specimens, including both sexes, in the collection of Dr. C. T. Brues, from the following localities—Woods Hole, Chester, and Williamsburg, Massachusetts; Cornish, New Hampshire; and Buttonwoods, Rhode Island; and one male from Roxboro, Pennsylvania, in the collection of Mr. A. B. Champlain, of Harrisburg, Pennsylvania.

4. METEORUS MAXIMUS, new species.

This is the largest of our North American species of *Meteorus* and resembles very closely the European *albiditarsis* Curtis. It apparently differs from the latter species in the somewhat longer radial cell, the much less prominent spiracles of the first abdominal segment, the more slender abdomen, and the slightly longer ovipositor.

Female.—Length 10 mm. Head transverse; face a little broader at base of clypeus than long, punctate, shining, slightly convex; maxillary palpi long, the last segment slightly longer than the preceding segment; eyes very large, extending nearly to the base of the mandibles, so that the malar space is almost wanting: antennae very long, 47-segmented, the first flagellar segment a little longer than scape and pedicel united; ocelli large, the greatest diameter of a lateral ocellus longer than the ocell-ocular line; temples strongly receding; occipital carina high, the shortest distance between it and a lateral ocellus about one and one-half times the diameter of an ocellus; mesonotal lobes well marked off, the parapsidal furrows sharp and deep, the lobes weakly punctate and shining. Disk of scutellum triangular, a little longer than broad at base; propodeum coarsely reticulated, with two short, rather smooth transverse basal areas; propleura punctato-rugulose anteriorly, and with transverse rugae in the depression; mesopleura with the lower half conspicuously sunken and finely closely punctate, and also with a rugulose area in the upper basal angle; wings with stigma narrow, three times as long as broad; nervulus slightly postfurcal; recurrent vein entering extreme apex of first cubital cell; first abscissa of radius less than half as long as the second, the latter nearly as long as first intercubitus and longer than second intercubitus; last abscissa of radius slightly longer than last abscissa of cubitus; posterior wing with radiellan cell distinctly broadening toward apex and divided before the middle by an indistinct cross-vein; nervellus decidedly longer than lower abscissa of basella; posterior coxae long, smooth, almost polished; inner spur of posterior tibiae hardly one-third as long as the metatarsus; abdomen long, slender; first segment long, its spiracles placed about in the middle; the two dorsal fossae on petiole rather small, narrow and well separated; first tergite very weakly roughened, not striate, or with only a few irregular short striae laterally; ventral margins of first tergite widely separated; dorsum of abdomen beyond first tergite smooth and polished; ovipositor sheaths not quite half as long as the abdomen. Uniformly ferrugino-testaceous, with third, fourth, and fifth abdominal segments partly brown; antennae testataceous; wings hyaline, stigma yellowish, veins pale brown; legs testaceous; joints between posterior trochanters and femora blackish; posterior tarsi whitish.

Type locality.—Colorado.

Type.—Cat. No. 24966 U.S.N.M.

Described from three female specimens labeled "Colo., Collection Ashmead." One of the paratypes has 47-segmented antennae; the other specimen has the antennae broken.

There are in the national collection three other female specimens of this species, which were not included in the type series: one from Texas; one labelled "Wellington, Kansas, E. G. Kelly, Exp. No. 151539"; and one collected by E. S. Southworth, at New Salt, New York, July 16, 1903.

5. METEORUS RETICULATUS, new species.

Resembles *maximus*, but is much smaller; it differs further in its mostly fuscous antennae and in the posterior tarsi being testaceous or ferruginous rather than white.

Female.—Length 5.5 mm. Face about as broad at base of clypeus as long, weakly punctate, shining; eyes large, the malar space very short, as in *maximus;* antennae 39-segmented, the first and second flagellar segments of equal length; ocell-ocular line equal to greatest diameter of an ocellus; thorax slender; parapsidal grooves well defined; mesonotal lobes smooth and shining; propodeum reticulated, the interstices large and smooth, shining; in the type there are two short transverse basal areas and two rather large median areas moderately well defined; median longitudinal carina on propodeum more or less distinct; propleura closely punctate, the depression crenulate; mesopleura punctato-regulose on lower half, smooth and polished above; wings as in *maximus*, except that in the type the nervulus is interstitial with basal vein; this character is variable, however, and of little significance; posterior coxae long, mostly polished, with only scattered weak punctures; inner spur of posterior tibiae about one-third as long as metatarsus; abdomen slender; the first segment narrow, the petiole provided with a pair of small, narrow, dorsal fossae; first tergite faintly roughened at base; weakly longitudinally roughened posteriorly, shining; ovipositor sheaths less than half as long as the abdomen. Uniformly ferruginous except the antennae which are mostly fuscous; legs, including posterior tarsi, concolorous with the body; wings hyaline, stigma yellow.

Male.—One antenna of allotype has 39 segments, the other 40; the pro-, meso-, and metapleura are more coarsely roughened; malar space about one-third the basal width of mandible; antennae fuscous, scape testaceous below; stigma dark brown.

Type locality.—Mount Washington, New Hampshire.

Allotype locality.—Hanover, New Hampshire.

Type.—Cat. No. 24967, U.S.N.M.

Described from two specimens, the type with only the locality data, the allotype labeled "Hanover, N. H., C. M. Weed."

One other female specimen that appears to belong to this species, and is labeled "Wash. Terr.," is in the National Museum. The ocell-ocular line is a little shorter than diameter of an ocellus, and the posterior tarsi are a little infuscated.

6. METEORUS COMMUNIS (Cresson).

Perilitus communis CRESSON, Canad. Entom., vol. 4, 1872, p. 82, line 12.

Perilitus intermedius CRESSON, Canad. Entom., vol. 4, 1872, p. 82, line 30.

Meteorus communis Cresson, CRESSON, Synops. Hymen., N. Amer., 1887, p. 228.

Meteorus intermedius Cresson, CRESSON, Synops. Hymen., N. Amer., 1887, p. 229.

Meteorus petiolariferus VIERECK, Bull. 22, Conn. State Geol. and Nat. Hist. Survey, 1917 (1916), p. 223.

Meteorus pretiosus VIERECK, Bull. 22, Conn. State Geol. and Nat. Hist. Survey, 1917 (1916), p. 223.

Type.—In the Philadelphia Academy of Sciences. The type of *intermedius* is in the same collection; those of *petiolariferus* and *pretiosus* are in the Connecticut Agricultural Experiment Station at New Haven. A paratype of *pretiosus* is in the collection of Bureau of Plant Industry at Harrisburg, Pennsylvania.

A thorough study of all the types convinces me that *communis*, *intermedius*, *petiolariferus*, and *pretiosus* are the same species. The rather marked difference between many males and the usual female is doubtless responsible for the names, *intermedius*, *petiolariferus*, and *pretiosus*, all of which were based on male specimens. Commonly, in the male the stigma and the antennal flagellum are much darker than in the female; the recurrent nervure often enters the first cubital cell, while in the female it is normally interstitial with the first intercubitus; the body coloring of the male is generally darker; the propectus is often more or less blackish, and the mesonotal lobes are frequently infuscated, while the first abdominal tergite is nearly always wholly black or blackish and the apical abdominal segments are often dark. The fuscous or blackish markings are usually much less pronounced in the female or are wholly wanting.

Distribution.—Evidently distributed over the entire United States and much of Canada. One of our commonest species, especially in the eastern part of the country. I have seen material from the following States and Provinces: Connecticut, Massachusetts, Rhode Island, Maine, New Hampshire, Vermont, New York, Pennsylvania, North Carolina, Michigan, Colorado, Oregon, Quebec, Ontario, British Columbia.

Hosts.—Since other species of *Meteorus*, especially *hyphantriae*, have so often been determined as *communis* and the host records published as those of *communis*, I have considered it unwise to accept any of these records. The following list of hosts is taken from the labels on specimens of *communis* which I have examined: *Hadena procincta* Grote; *Graptolitha laticinerea* Grote; *Graptolitha*, species; *Cirphis unipuncta* Haworth; *Malacosoma americana* Fabricius.

Several hundred specimens, from numerous localities, have been studied in the course of the determination of the limits of this species. This material was from the following collections: That of the United States National Museum; Cornell University; the Boston Society of Natural History; that of Doctor Brues of Harvard University; that of Mr. Banks of the Museum of Comparative Zoology, Cambridge, Massachusetts; and the collection at the gypsy moth laboratory, at Melrose Highlands, Massachusetts.

7. METEORUS INDAGATOR (Riley).

Perilitus indagator Riley, 4th Ann. Rpt. Ins. Missouri, 1872, p. 43.
Meteorus indagator Riley, Cresson, Synops. Hymen. N. Amer., 1887, p. 229.
Meteorus campestris Viereck, Trans. Kansas Acad. Sci., vol. 19, 1905, p. 281.

Type.—In the United States National Museum; the type of *campestris* is in the University of Kansas collection.

Very similar to *loxostegei* Viereck; but distinguished from that species by the characters given in the key. The ovipositor sheaths are noticeably longer than in *loxostegei*, being nearly as long as the abdomen; the mesopleura are usually more smooth and polished, with only a longitudinal crenulate furrow; and the ventral margins of the first tergite almost or quite touch, while they are distinctly separated in *loxostegei*. The first tergite, especially on the postpetiole, is finely granularly roughened between the longitudinal striae, which are usually not prominent; this type of sculpturing is found also in *loxostegei*. The face, especially in the female is noticeably narrower in *indagator*, the eyes being very large.

Distribution.—Missouri, California, Arkansas, Connecticut, Florida, North Carolina, South Carolina, Maryland, Kansas, Massachusetts. These are the States from which I have seen material; the species undoubtedly will be found over the entire country.

Hosts.—(*Acrobasis*) *Mineola juglandis* LeBaron (Riley); *Acrobasis betulella* Hulst; *A. caryivorella* Ragonot; *Mineola indigenella* Zeller; *Tetralopha subcanalis* Walker; *Dioryctria xanthaenobares* Dyar; *Tetralopha platanella* Clemens; *Acrobasis caryae* Grote (?); "leaf roller on honey locust"; "leaf roller on sweet fern"; and "leaf tyer on sweet gum." *M. indagator* has also been recorded by Riley and Howard[7] from *Evergestis rimosalis* Guenée, by Howard[8] from *Loxostege sticticalis* Linnaeus, and by Chittenden[9] from *Peridroma saucia* Hübner. The last record is undoubtedly incorrect; very probably the parasite in this case was *M. vulgaris*. It is also quite possible that the records from *Evergestis* and *Loxostege* concerned *M. loxostegei* rather than *indagator*.

The above notes and host and locality records are based on a considerable amount of material in the United States National Museum and in the collection of the gypsy-moth parasite laboratory.

8. METEORUS LOXOSTEGEI Viereck.

Meteorus loxostegei VIERECK, Proc. U. S. Nat. Mus., vol. 39, 1911, p. 401.

Type.—In the United States National Museum.

As noted in the discussion under *indagator*, these two species are very similar; but they are certainly distinct and can be separated by the characters mentioned in the key and in the discussion just referred to.

Distribution.—The following States were represented by the material which I have seen: Colorado, Nebraska, New Mexico, Maryland, Massachusetts.

Hosts.—*Loxostege sticticalis* Linnaeus (Viereck); *Pyrausta futilalis* Lederer; and *P. nubilalis* Hübner.

Besides the type, there are seven other specimens in the United States National Museum from the type locality, Rocky Ford, Colorado, and from the same host as the type; also a large series reared from *Pyrausta futilalis* at College Park, Maryland, by Mr. A. B. Gahan. Six specimens reared from *L. sticticalis* in Nebraska, one specimen from Maxwell, New Mexico, and one labeled as reared from a "Nelumbians pyralid," but bearing no locality data, are likewise in this collection. The Boston Society of Natural History has one specimen taken at Woods Hole, Massachusetts. I have also seen two specimens reared from larvae of the introduced corn borer, *Pyrausta nubilalis*, collected at Watertown, Massachusetts.

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[7] Insect Life, vol. 3, 1890, p. 58.

[8] Idem, vol. 6, 1894, p. 371.

[9] Bull. 20, n. s., U. S. Bur. Ent., p. 63.

9. METEORUS POLITUS (Provancher).

Perilitus politus PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 126.
Meteorus politus Provancher, CRESSON, Synops. Hymen. N. Amer., 1887, p. 229.

Type.—In the Museum of Public Instruction in Quebec, Canada.

Distinguished at once by the somewhat infumated wings and the unusually long petiole of the first discoidal cell. Usually the thorax is black, and the abdomen practically entirely reddish, although the latter is sometimes more or less blackish at base or apex; antennae of the female specimens I have seen have 25 segments, with the apical segment unusually large; the male antennae have 29 to 30 segments; radial cell narrow and short; nervulus interstitial with basal vein, or nearly; the nervellus is shorter than lower abscissa of basella, which is usually subequal with upper abscissa or a little shorter; first tergite rather coarsely striate, the ventral margins widely separated.

Distribution.—Canada; northeastern United States.

Host.—Unknown.

The National Collection has a homotype labeled as such by Mr. Gahan; this specimen has no locality label, but it is a Harrington specimen, and is probably from Ottawa. There is one other specimen, from Ottawa, Canada, in the United States National Museum. In the Cornell University collection there is a female of this species, from Coniston, Ontario; and in Doctor Brues's collection there are several specimens from Truro, Nova Scotia; and Petersham, and Barnstable, Massachusetts.

10. METEORUS PROVANCHERI Dalla Torre.

Perilitus gracilis PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 125.
Meteorus gracilis Provancher, CRESSON, Synops. Hymen. N. Amer., 1887, p. 228.
Meteorus provancheri DALLA TORRE (=*gracilis* PROVANCHER, preoccupied), Catalogus Hymenop., vol. 4, 1898, p. 112.

Type.—In the Museum of Public Instruction in Quebec.

Distribution.—Canada.

Host.—Unknown.

I have seen no specimens of this species; but have given it its place in the key on the basis of the original description and notes made by Mr. Gahan upon an examination of the type. It has been placed with *politus*, *angustipennis*, and *fumipennis* because Provancher mentioned slightly infumated wings. It is evidently an exceedingly small species. Following are Mr. Gahan's notes in part:

> This is the smallest species known to me. Petiole apparently has very indistinct fossae above. Head full behind eyes; ocelli very small, postocellar line shorter than ocell-ocular line; antennae broken; first flagellar segment fully three times as long as thick, longer than scape and pedicel combined, and about equal to second flagellar segment; malar space less than base of mandible; face shining, faintly rugulose, vertex polished; mesonotum polished, the parapsidal grooves defined and faintly crenulate; propodeum with a median carina, two sublateral and two transverse carinae, one near

base and one at apex of truncation, all very weak; petiole ruguloso-striate, without fossae dorsally, or if present they are very indistinct; rest of abdomen smooth and polished; ovipositor nearly as long as thorax and abdomen together and only a little swollen at base; wings with stigma triangular, radius originating in the middle, first abscissa of radius not more than one-third the length of the second abscissa, the latter shorter than second transverse cubitus; nervulus very slightly postfurcal. Head and thorax dark succineous, abdomen blackish above.

This species seems to be very similar to *alaskensis* Ashmead, and may be identical with it, in spite of Provancher's mention of infumated wings. In the description of species belonging to other groups this worker has often referred to faintly subhyaline wings as "slightly infumated"; should that be the case here the species will run to *alaskensis* in the foregoing key.

11. METEORUS ANGUSTIPENNIS, new species.

A very slender species, with unusually narrow, somewhat infumated, wings; it is easily distinguished from *fumipennis* by the very long lower abscissa of basella, and by the finely punctate condition of the vertex and mesonotal lobes; from *politus* it is at once separated by the practically sessile first discoidal cell.

Female.—Length 3.2 mm. Head transverse, very slightly broader than thorax; eyes enormous, strongly convergent; face unusually narrow, its width at base of clypeus much less than its length from antennae to clypeus, very minutely sculptured; malar space so short as to be almost wanting; antennae missing beyond pedicel; ocell-ocular line two and one-half times as long as greatest diameter of an ocellus; vertex, temples, and cheeks shining, distinctly very finely punctate; thorax very slender; mesonotal lobes prominent, minutely but distinctly sculptured, especially the middle lobe; lateral lobes meeting posteriorly; disk of scutellum very small, somewhat elevated, polished; propodeum rugoso-reticulate, with a suggestion of two large median areas on dorsal face; propleura, mesopleura except posteriorly, and the metapleura, coarsely rugulose; wings narrow; nervulus in type very slightly antefurcal; recurrent vein entering first cubital cell; first abscissa of radius as long as, or longer than, the second; last abscissa of radius attaining wing distinctly before apex; lower abscissa of basella at least one and one-half times as long as nervellus and decidedly longer than upper abscissa of basella; posterior coxae small, about as long as their trochanters, slightly roughened on outer face; inner spur of posterior tibiae about one-fourth as long as the metatarsus; abdomen very slender; the first tergite finely ruguloso-striate, especially on the postpetiole, and provided with two distinct dorsal fossae on the petiole; remainder of abdomen smooth and shining; ovipositor sheaths about as long as the abdomen. Black; face, clypeus and mandibles brown; wings distinctly infumated; stigma brown; paler at base; legs ferrugino-testaceous;

abdomen black, except the connate second and third tergites, which are ferruginous; ovipositor sheaths brown.

Male.—Like the female except as follows: Eyes much smaller, the face broader at base of clypeus than long; malar space nearly or quite equal to basal width of mandibles; antennae 31-segmented, pale yellow on basal half, dusky beyond; nervulus practically interstitial with basal vein; stigma mostly pale with a brownish blotch posteriorly.

Type locality.—Salineville, Ohio.

Type.—Cat. No. 24964, U.S.N.M.

Described from one female and one male, both from Salineville, Ohio, and bearing a label with Ashmead's manuscript name, *Protelus ohioensis*. There is one other male specimen from Ohio in the National Collection; this is not included in the type series. I have also seen eight specimens of this interesting species in the Cornell University collection: three of these are from Ithaca, New York; five from Salineville, Ohio; a female specimen in this collection has complete antennae; they are 25-segmented, are slightly thickened toward apex and almost entirely pale yellow, being only a little infuscated at apex. A male of *angustipennis* was included by Cresson in his type series of *dimidiatus;* it bears paratype No. 1770.6 and is from Pennsylvania.

12. METEORUS FUMIPENNIS, new species.

Very closely allied to *angustipennis*, but distinguishable at once by the differences noted in the table to species.

Female.—Length 4 mm. Head transverse, but full behind the eyes, distinctly broader than thorax; face broader at base of clypeus than long, very minutely closely punctate laterally; palpi very slender; malar space about half as long as basal width of mandibles; antennae slender, 29-segmented, the apical segments shortened, but somewhat longer than broad; basal flagellar segment at least three times as long as thick; vertex smooth and polished, ocelli very small, the ocell-ocular line nearly three times as long as greatest diameter of an ocellus; thorax unusually slender, much narrower than head, and at least three times as long as its greatest breadth; mesonotal lobes well set off by sharp parapsidal furrows, the lateral lobes meeting at posterior margin of mesoscutum; the depression behind middle lobe of mesonotum rugulose and opaque; remainder of mesoscutum smooth and shining, with only a few scattered indistinct punctures; disk of scutellum small, triangular, slightly convex, smooth and shining; propodeum rugulose, with a median, two sublateral, and two transverse weak carinae marking off four rather large areas on the dorsal face, the two anterior areas narrow, transverse; propleura, mesopleura, except a small medial polished area, and metapleura entirely, rugulose; wings narrow; stigma large, triangular; nervulus slightly postfurcal; recurrent vein entering first cubital cell near apical angle; first abscissa of radius shorter than second, sometimes subequal; radial cell short, ending much before apex of wing; last abscissa of radius shorter than last abscissa of cubitus; nervellus nearly or quite as long as lower abscissa of basella, which is distinctly shorter than the upper abscissa; posterior coxae small, about as long as their trochanters, polished; posterior tarsi about as long as their tibiae; the inner spur of hind tibiae about one-fourth the length of the metatarsus; abdomen slender; first tergite very finely striate, with two distinct fossae on the petiole above; remainder of abdomen smooth and polished; ovipositor sheaths slender, fully three-fourths as long as the abdomen. Black, face, clypeus, mandibles except tips, ferrugino-testaceous; basal half of antennae ferruginous, apical half dusky; temples and cheeks dark ferruginous; a spot on the front extending to and including the ocelli, black; occiput black; thorax almost entirely black, with a little reddish on the prothorax and on mesoscutum posteriorly; wings distinctly a little infumated, the stigma brown, pale at base, veins yellowish-brown; legs ferruginous, posterior femora slightly darker than the rest; abdomen black, except second segment, which is brown.

Type.—Cat. No. 24963, U.S.N.M.

Type locality.—Easton, Washington.

Described from three female specimens apparently collected by Koebele. There are three additional females, from Santa Cruz Mountains, California, in the national collection; these have not been included in the type series.

13. METEORUS HUMILIS (Cresson).

Perilitus humilis Cresson, Canad. Entom., vol. 4, 1872, p. 84.
Perilitus robustus Provancher, Addit. faun. Canad. Hymen., 1886, p. 123.
Meteorus humilis Cresson, Cresson, Synops. Hymen. N. Amer., 1887, p. 228.
Meteorus robustus Provancher, Cresson, Synops. Hymen. N. Amer., 1887, p. 229.
Meteorus orchesiae Ashmead, Proc. U. S. Nat. Mus., 1888, p. 643.
Meteorus agilis Viereck, Trans. Amer. Ent. Soc., vol. 29, 1903, p. 94.

Type.—The types of *humilis* and *agilis* are in the Philadelphia Academy of Sciences; that of *robustus* is in the Museum of Public Instruction, in Quebec; and that of *orchesiae* is in the United States National Museum.

This species is very similar to *terebratus* and *hicoriae*, but can be readily separated by the characters given in the key. The length of the ovipositor sheaths will at once distinguish the females; while the more or less roughened and opaque outer faces of the posterior coxae, the length of the malar space, and the relative length of the first and second abscissae of the radius will separate the males. The radial cell is rather large, extending nearly to apex of wing; the lower abscissa of basella is usually shorter than nervellus and but little more than half the length of upper abscissa of basella; the female antennae are shortened, but little longer than head and thorax united; male antennae extend about to the apex of the abdomen, with 29 to 32 segments; thorax always mostly black; abdomen black, except the connate second and third segments, which are more or less ferruginous.

Distribution.—Illinois, Canada, Michigan, New Mexico, Maryland, Virginia, District of Columbia, New York, Colorado, Oregon. Doubtless the species is generally distributed over the United States and Canada.

Hosts.—*Orchesia castanea* Melsheimer (Ashmead); *Platydema ellipticum* Fabricius; "scarabaeid larva"; *Tinea oregonella* Busck.

A study of the types of *humilis*, *orchesiae*, and *agilis* has convinced me that they are the same species; and the original description of *robustus*, together with Mr. Gahan's detailed notes, made on an examination of the type, has led me to place this name also in the synonymy of *humilis*. In addition to the types of *humilis*, *orchesiae*, and *agilis*, I have seen the following material: One specimen, apparently from Quebec, Canada, which Mr. Gahan compared with the type of *robustus;* one reared from fungus infested with *Orchesia*, species and *Homosetia*, species by Mr. H. S. Barber, near Plummer Island, Maryland; two specimens reared from *Tinea oregonella* at Parkers Station, Oregon, by P. D. Sergent, Nov. 17, 1914; one bred from a scarabaeid larva by Dr. T. E. Snyder at Falls Church, Virginia; one reared from *Platydema ellipticum* at Washington, District of Columbia; and collected specimens from Cusack Ranch and West Cliff, Colorado; Oswego and Spencer Lake, New York; Ottawa and Val Morin, Canada; and Hood River, Oregon.

14. METEORUS ALASKENSIS (Ashmead).

Dyscoletes alaskensis ASHMEAD, Proc. Wash. Acad. Sci., vol. 4, 1902, p. 247.

Type.—In the United States National Museum.

This species is exceedingly like *provancheri*, as noted in the discussion of that species; but for the present it must be held distinct. It is readily separated from *tibialis*, to which it is also very similar, by the characters given in the key.

Popof Island, Alaska.

Host.—Unknown.

That this species is a *Meteorus* was brought to my attention by Mr. S. A. Rohwer, after my departure from the Museum. He has kindly supplied the characters for distinguishing it from *tibialis*.

15. METEORUS TIBIALIS, new species.

Closely resembles *humilis*, but differs in having smoother posterior coxae; in the second abscissa of radius being usually much less than twice as long as first; in the darker posterior tibiae; in the abdomen being usually less strongly petiolate; and in the much longer female antennae.

Female.—Length 4.5 mm. Head transverse, but rather full behind the eyes; face twice as broad as long between base of antennae and clypeus, weakly roughened; malar space nearly as long as basal width of mandibles; eyes moderate to small, very sparsely pubescent; antennae slender, 36-segmented, the first flagellar segment distinctly a little shorter than the second; ocelli small, the ocell-ocular line two and a half times as long as greatest diameter of a lateral ocellus; mesoscutum smooth and shining, with only indistinct punctures; the parapsidal grooves strongly marked, crenulate, meeting in a small rugulose sunken area just in front of posterior margin of mesoscutum; scutellum smooth and shining with some faint punctures; propodeum rugoso-reticulate, with a median longitudinal carina and an irregular transverse carina near base; propleura largely smooth, but more or less crenulate in the depression; mesopleura smooth and shining, with a curved crenulate furrow and a few punctures on lower half, and with a small roughened area beneath anterior wings; metapleura rugulose; entire thorax covered with conspicuous whitish pubescence; anterior wing with a large triangular stigma; second abscissa of radius about one and one-half times as long as first abscissa, and two-thirds as long as second intercubitus; third abscissa of radius going almost to extreme apex of wing; recurrent vein entering first cubital cell near apex; posterior wing with radiellan cell not narrowing apically; nervellus slightly longer than lower abscissa of basella; legs slender; posterior coxae smooth and polished, often weakly punctate outwardly at base; posterior tibiae as long as their trochanters and femora combined; abdomen slender, at least as long as head and thorax combined; first segment two-thirds to three-fourths as long as remainder of abdomen, stouter than is usual in this genus, and not so distinctly divided into a petiole and postpetiole; the entire first tergite, from base to apex, is roughened, largely striate, and is provided with two enormous fossae very near the base; ventral margins of first tergite widely separated; remainder of dorsum of abdomen smooth and polished; ovipositor sheaths slightly longer than the abdomen. Black; head and thorax wholly black, except the clypeus and mandibles, which are mostly reddish, and the antennae, which are pale brown beneath; wings hyaline; stigma dark brown, with a conspicuous pale spot at base; legs reddish testaceous, the anterior pair palest; posterior tibiae brown, pale yellow at base, and reddish along the upper edge; posterior tarsi brown; abdomen black, except the combined second and third segments, which are reddish testaceous.

Male.—Like the female in all essential characters.

Type.—Cat. No. 25412, U.S.N.M.

Type locality.—Syracuse, New York.

Described from 12 female and 7 male specimens collected by C. J. Drake on *Rhus* in early May. The color of the species varies somewhat from that of the type; some of the paratype specimens have more or less reddish on the apical abdominal segments, and the antennae of some females are almost wholly testaceous, while at least one male has the antennae entirely black. The number of segments in the antennae varies from 33 to 38 in both sexes, in the type series. I have seen another series of 30 specimens, in the Cornell University collection, taken at Montreal, Canada, in May, 1902. These average a little smaller than the Syracuse specimens and the number of segments in the antennae is correspondingly reduced, varying from 31 to 34.

16. METEORUS TEREBRATUS, new species.

Distinguished especially by the unusually long ovipositor, which is longer than the entire body. It differs further from *humilis*, to which it is related, by the much longer malar space, and the smooth posterior coxae.

Female.—Length 4.5 mm.; head transverse, but full behind the eyes; face with distinct separate punctures, rather opaque, twice as broad at base of clypeus as long; mandibles nearly as broad at base as the greatest width of clypeus; malar space as long as basal width of mandibles; antennae missing beyond first flagellar segment, which is about as long as scape and pedicel united; ocelli very small, the ocell-ocular line at least two and one-half times as long as greatest diameter of an ocellus; vertex smooth and polished; temples broad, polished; mesoscutum smooth and shining; the lobes well set off by sharp parapsidal furrows; propodeum closely rugose, the longitudinal and transverse carinae not well defined; the dorsal face accordingly not distinctly areolated; propleura finely rugulose; mesopleura mostly smooth with a rugulose area in the upper basal angle and a longitudinal crenulate furrow below; metapleura wholly coarsely rugoso-punctate; wings with stigma large, triangular; recurrent vein entering first cubital cell near first intercubitus; first abscissa of radius about half the second, the second at least half the length of first intercubitus; radial cell large, extending nearly to apex of wing; posterior coxae about as long as their trochanters, smooth and polished; posterior femora relatively smooth; inner spur of hind tibiae less than one-fourth the length of the metatarsus; abdomen slender; first tergite finely striate and provided with two fossae on the petiole above; remainder of abdomen smooth and polished; ovipositor sheaths about 6 mm. in length, distinctly longer than the entire body. Black; head mostly ferruginous; prothorax ferruginous, brownish above on the sides; rest of thorax black; tegulae testaceous; wings hyaline, stigma brown, pale at base; legs ferruginous, the hind femora at apex, apex of hind tibiae and the hind tarsi more or less infuscated; first abdominal tergite black; second and third tergites ferruginous; beyond, brownish black.

Male.—Thorax not so black as in female, rather brownish black; first abdominal tergite reddish black; malar space longer than basal width of mandibles; inner spur of posterior tibiae nearly a third the length of metatarsus; otherwise agrees with female.

Type.—Cat. No. 24962, U.S.N.M.

Type locality.—Grand Ledge, Michigan.

Host.—Probably *Orchesia castanea* Melsheimer.

Described from one male and one female which were included in Ashmead's type series of *orchesiae*. The female had no red label, but the word "Type" was written in one corner of the name label, in Ashmead's hand; the male bore a red label with the type catalogue number of *orchesiae*.

17. METEORUS HICORIAE, new species.

Closely resembles *humilis* and *terebratus*, but distinguished as noted in the key. It also resembles *tibialis*, agreeing with this species in the stout first abdominal segment; it differs, however, in the shorter ovipositor and the paler legs.

Female.—Length 4 mm. Head transverse, but rather full behind the eyes; face broad, much broader at base of clypeus than long, minutely sculptured; clypeus punctate; malar space less than half as long as basal width of mandibles; antennae much shorter than body, 24-segmented; ocelli very small, the ocell-ocular line at least two and one-half times the greatest diameter of an ocellus; vertex and temples polished; mesoscutum indistinctly punctate, shining; the mesonotal lobes prominent, the parapsidal grooves strongly impressed; propodeum weakly roughened, with a median, two sublateral, and two transverse carinae marking off four areas on the dorsal face; propleura almost entirely smooth, strongly shining; mesopleura smooth and polished, somewhat punctate in the basal upper angle, and with a finely crenulate longitudinal furrow; metapleura mostly smooth and shining; wings with stigma large, triangular; first abscissa of radius shorter than the second, the second less than half the length of the first intercubitus; radial cell long, nearly attaining apex of wing; third abscissa of radius as long as last abscissa of cubitus; recurrent vein not quite interstitial with first intercubitus, entering apical angle of first cubital cell; nervulus a little postfurcal; posterior coxae small, hardly as long as their trochanters, perfectly smooth, polished; inner spur of posterior tibiae hardly one-third as long as metatarsus; first abdominal segment rather stout, finely longitudinally striate above and provided with two conspicuous fossae anteriorly; ventral margins of first tergite widely separated; remainder of dorsum of abdomen smooth and polished; ovipositor sheaths about two-thirds to three-fourths the length of the abdomen, the ovipositor somewhat curved downward. Black; scape and pedicel of antennae yellow, flagellum pale brown, becoming darker apically; face, clypeus, and mandibles except tips, ferruginous; vertex, occiput, and temples blackish; prothorax entirely ferruginous; rest of thorax black; wings hyaline, stigma dark brown, pale at base; legs, including coxae and femora entirely, yellow; posterior tibiae apically, and posterior tarsi slightly infuscated; abdomen black, except second tergite, which is ferruginous or brownish; ovipositor sheaths brownish.

Type.—Cat. No. 24965, U.S.N.M.

Type locality.—Harrisburg, Pennsylvania.

Host.—Unknown.

Described from three female specimens collected by Mr. W. S. Fisher on *Hicoria*, August 7, 1914. There are three other female specimens, not included in the type series, in the United States National Museum, two were collected by Mr. Fisher at Harrisburg, June 22, 1914; and one labeled "Huron Mts., L. S., 7-9."

18. METEORUS TRACHYNOTUS Viereck.

Meteorus trachynotus VIERECK, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 142.
Meteorus archipsidis VIERECK, Proc. U. S. Nat. Mus., vol. 43, 1912, p. 579.

Type.—Types of both species in the United States National Museum.

Malar space about half as long as basal width of mandibles; ocell-ocular line rarely quite twice as long as greatest diameter of an ocellus; antennae slender, normally with 32 to 34 segments; stigma brown, pale at base; first abscissa of radius usually about equal to second; the third abscissa of radius going to extreme apex of wing; first abdominal tergite finely striate, with two large fossae on petiole, the ventral margins of the tergite widely separated; color varies from mostly black to mostly testaceous. The cocoon is very thin, and milky white in color.

Distribution.—Canada, New York, Pennsylvania, New Jersey, California, Colorado, Utah, Vancouver Island, Louisiana, Massachusetts, New Hampshire, Maine, Florida; probably occurs throughout the United States and at least southern Canada.

Hosts.—*Harmologa fumiferana* Clemens (Viereck); *Cacoecia argyrospila* Walker (Viereck); *Ancylis comptana* Frölich; *Ancylis*, species; *Ania limbata* Haworth; *Wilsonia*, species.

A study of the types of *trachynotus* and *archipsidis* shows positively that they are the same species. In addition to the types the United States National Museum has the following material: Five specimens reared from *C. argyrospila* by D. D. Penny, at Watsonville, California; two reared from *Ancylis comptana* by H. B. Scammell, at Whitesburg, New Jersey; one from *Ancylis*, species, by the same collector, at the same locality; one labeled "Mo., Par. *Wilsonia*, 7-15-'87"; one from *Ancylis comptana*, reared by R. W. Doane, in Utah; and collected specimens from Youngstown, New York; Northeast Harbor, Maine, Jacksonville, Florida; Cheyenne Canyon, Colorado; Ottawa and Victoria, Canada. There are in the Cornell collection specimens from Springlake and Little Falls, New York; and Truro, Nova Scotia; in Doctor Brues's collection, one from Chester, Massachusetts, and one from the White Mountains, New Hampshire; and in Mr. Banks's collection one from Pennsylvania.

19. METEORUS TAURICORNIS (Provancher).

Rhopalophorus tauricornis PROVANCHER, Natural. Canad., vol. 12, 1880, p. 168.
Eustalocerus tauricornis Provancher, PROVANCHER, Addit. faun. Canad. Hymen., 1888, p. 378.

Type.—In the Museum of Public Instruction in Quebec.

Head large, full behind the eyes; ocelli very small; petiole of abdomen longer and more slender than is usual in this genus, and not possessing the dorsal fossae; ventral margins of first tergite touching for half the length of the segment; female antennae bright yellow, blackish at apex; male antennae brown. This species has the general appearance and many characters of the group of species typified by *humilis;* but the first tergite differs widely, resembling that of *dimidiatus* more nearly.

Distribution.—Canada, New York, New Hampshire, Massachusetts, Maryland, Virginia, Pennsylvania, Michigan, Iowa.

Host.—Unknown.

The United States National Museum has the following material: A homotype (determined by Gahan), from Oswego, New York; other collected specimens from Cabin Lodge, Maryland (R. M. Fouts); Ithaca, New York; Arlington, Virginia; North East, Pennsylvania, (R. A. Cushman); Agricultural College, Michigan; Ames, Iowa; and Ottawa, Canada. In the Cornell University collection there are specimens from Springlake, Saranac Lake, Slaterville, and Ithaca, New York; and Waubamic, Ontario; Doctor Brues's collection has specimens from Woods Hole and Fall River, Massachusetts; and Flatbush, Long Island; and Mr. Banks has specimens from Falls Church and Glencarlyn, Virginia.

29. METEORUS DIMIDIATUS (Cresson).

Perilitus dimidiatus CRESSON, Canad. Entom., vol. 4, 1872, p. 83.
Meteorus dimidiatus Cresson, CRESSON, Synops. Hymen. N. Amer., 1887, p. 228.
Meteorus noctivagus VIERECK, Trans. Kansas Acad. Sci., vol. 19, 1905 (1903-1904), p. 281.

Type.—In the Philadelphia Academy of Sciences. The type of *noctivagus* is in the collection of Kansas University.

This species, while rather easily distinguished, has often been confused with related species. Even in his type series Cresson included, as paratypes, a male of *angustipennis* and a female of *communis*, respectively bearing the Nos. 1770.6 and 1770.8. It is most similar to *bakeri*, *autographae*, and *vulgaris*, and these have frequently been determined as *dimidiatus*. From *bakeri* it differs principally as noted in the key. The wings are never clear hyaline as in that species, and the ovipositor sheaths are two-thirds to three-fourths the length of the abdomen. Very often the recurrent vein is interstitial with the first intercubitus; otherwise it enters the second cubital cell at the extreme basal angle, rarely going into this cell as distinctly as is true of *bakeri*; the lower abscissa of basella is almost always distinctly longer than the upper abscissa, and also longer than the nervellus. From *autographae* this species can at once be distinguished by the brown cloud in the stigma, and the shorter antennae; and from *vulgaris* by the brownish stigma and the more slender ovipositor. The eyes are large, and strongly convergent in the female; consequently the face is narrow; ocell-ocular line usually one and one-half to two times the greatest diameter of an ocellus; antennae normally with 27 to 31 segments; propodeum evenly rugose; first abscissa of radius about half as long as the second; first abdominal tergite polished and without fossae on the petiole, finely ruguloso-striate on postpetiole; thorax usually mostly black, although occasionally largely testaceous; first tergite and apex of abdomen normally black.

Distribution.—Material from the following localities has been examined: Numerous points in New Jersey; New York, New Hampshire, Vermont, Maine, Massachusetts, Ohio, Illinois, Virginia, Michigan, Pennsylvania, District of Columbia, Colorado, Utah, California, Washington, Ontario, and Nova Scotia. The type locality of *noctivagus* was Lawrence, Kansas. A common species, widely distributed over the United States and Canada.

Host.—*Desmia funeralis* Hübner. Undoubtedly there are other hosts; but collections that I have seen contain almost no reared specimens. J. F. Strauss[10] reported *dimidiatus* from *D. funeralis*; this is the only good host record published. *Feltia subgothica*

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[10] U. S. Dept. Agr. Bull. 419, 1916, pp. 8-9.

Stephens was recorded by Riley and Howard[11] as a host; and Strickland[12] discussed the parasitism of *Porosagrotis orthogonia* Morrison by this species. But these records are incorrect; *M. vulgaris* was evidently the species reared in these two cases.

While I have not seen the type of *noctivagus*, I have had no hesitation in placing it in the synonymy of *dimidiatus*. The original description, and the excellent unpublished redescription prepared by Gahan, on a study of the type, conclusively show that *noctivagus* is *dimidiatus*. There is a considerable amount of material of this species in the National Museum, including the specimens reared from *D. funeralis* by Strauss. Many additional specimens, in the collections of Doctor Brues, Mr. Banks, the Boston Society of Natural History, and Cornell University, have been examined.

21. METEORUS BAKERI Cook and Davis.

Meteorus bakeri COOK and DAVIS, Bull. 73, Mich. Agr. Exp. Sta., 1891, p. 9.

Type.—Apparently lost.

Distinguished from *dimidiatus* as noted in the discussion under that species. The antennae normally have 29 to 31 segments; the ovipositor sheaths are about half as long as the abdomen; dorsum of thorax more or less marked with black, the venter always testaceous; abdomen mostly black or blackish, except second and third tergites, which are ferruginous.

Distribution.—Michigan, West Virginia, Kentucky, South Dakota, New York, Massachusetts, Rhode Island, New Hampshire.

Hosts.—*Hyphantria cunea* Drury; *H. textor* Harris.

Although the type seems to have been lost, the good original description, together with the figure and host record accompanying it, leaves no doubt as to the identity of the species. In the National Museum there are three specimens reared from *H. cunea* at French Creek, West Virginia (F. E. Brooks); two reared at Melrose Highlands, Massachusetts, from *Hyphantria*, probably *textor;* one bred from "fall webworm" at Lexington, Kentucky; another reared from the same host at Benton Harbor, Michigan (E. H. Siegler); and collected specimens from Agricultural College, Michigan; Oswego, New York; and South Dakota. At the gypsy-moth parasite laboratory, Melrose Highlands, Massachusetts, there are many specimens reared from the fall webworm collected at Reading Highlands and Beverly, Massachusetts; Putnam, Connecticut; and Westerly and Coventry, Rhode Island.

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[11] Insect Life, vol. 3, 1890, p. 68.

[12] Canad. Entom., vol. 53, 1921, p. 99.

22. METEORUS AUTOGRAPHAE, new species.

Closely resembles *dimidatus* and *bakeri*, from both of which it differs in the pale yellow stigma and the longer antennae.

Female.—Length, 4.5 mm. Head transverse; face not quite as broad at base of clypeus as long, minutely roughened, shining; malar space very nearly or quite as long as basal width of mandible; antennae very slender, slightly longer than the body, 33-segmented in type, the first flagellar segment more than three times as long as thick and a little longer than second; ocelli small, the ocellocular line one and one-half to two times as long as greatest diameter of an ocellus; vertex and temples polished; mesoscutum smooth and polished, with a finely rugulose area behind middle lobe; parapsidal grooves deep, crenulate; scutellum convex, polished; propodeum wholly finely rugulose; the dorsal face of propodeum long, the posterior face short and somewhat hollowed out medially; propleura finely rugulose, crenulate in the depression; mesopleura smooth and polished except for the longitudinal crenulate furrow, and a slightly roughened area beneath base of anterior wing; first abscissa of radius about half the length of the second, the latter nearly as long as second intercubitus; last abscissa of radius reaching wing margin a little before apex of wing; recurrent vein entering second cubital cell near the first intercubitus; radiellan cell not divided, narrowing a little towards apex; nervellus not quite as long as lower abscissa of basella; posterior coxae granular on the outer face; abdomen slender; first segment long, the petiole very narrow; the tergite of first segment polished on the petiole, finely, closely striate on postpetiole, the striae straight; ventral margins of first tergite barely meeting at one point near middle of segment; remainder of abdomen polished; ovipositor sheaths half the length of the abdomen. Ferruginous or testaceous, varied with black; head ferruginous, stemmaticum black; antennae pale, dusky at tips; thorax mostly ferruginous, the metanotum and propodeum brown or blackish; wings hyaline, stigma pale yellow; legs ferruginous, the posterior tarsi weakly infuscated; first abdominal tergite black or brown; remainder of abdomen ferruginous.

Male.—Like the female, except that antennae are 35-segmented, and the occiput, the mesonotal lobes, and the abdomen, except second tergite, are blackish.

Type.—Cat. No. 24968, U.S.N.M.

Type locality.—Norfolk, Virginia.

Described from two female and three male specimens reared by D. E. Fink from *Autographa brassicae* Riley. The species is a solitary parasite. In addition to the type series there is a vast amount of material in the National Museum, both reared and collected. Several large series reared by Mr. R. J. Kewley, at Columbia, South Carolina, from known parents, on *Laphygma frugiperda* Smith and Abbot and *Cirphis unipuncta* Haworth, are particularly valuable in demonstrating the wide variation in color in the species, even between parents and progeny, and among the progeny themselves. In all cases the progeny are apparently the result of parthenogenetic reproduction. The number of antennal segments in this lot of specimens varies from 32 to 36, a large majority of the individuals having 33 or 34 segments. Other material in the National Collection follows: One specimen reared from *Prodenia eridania* Cramer, at Macclenny, Florida, and two from the same host, at Bartow, Florida (B. L. Boyden); one from *Eurymus eurytheme* Boisduval at Nashville, Tennessee (C. C. Hill); one from *Plathypena scabra* Fabricius, at Charleston, Missouri (E. H. Gibson); one from *Evergestis straminalis* Hübner, Arlington, Virginia; one from *Phlyctaenia ferrugalis* Hübner, on alfalfa, at Clarksdale, Mississippi (W. R. McConnell); one from *Autographa*, "possibly *verruca* Fabricius," Clarksdale, Mississippi (McConnell); and specimens, without host records, from Gainesville, Florida; Washington, District of Columbia; Nashville, Illinois; Louisiana; and Canada. The Cornell collection has one specimen from Ridgewood, New Jersey (M. D. Leonard); and the gypsy-moth parasite laboratory has two specimens, one from Bangor, Maine (A. C. Ward); and one reared from *Alsophila pometaria* Harris, collected at Hampton, New Hampshire. The species is evidently more common over the southern part of the United States, east of the Mississippi, than farther north. It has apparently a wide range of hosts, but shows a distinct preference for noctuid larvae, particularly cutworms.

23. METEORUS VULGARIS (Cresson).

Perilitus vulgaris CRESSON, Canad. Entom., vol. 4, 1872, p. 83.
Meteorus vulgaris Cresson, CRESSON, Synops. Hymen., N. Amer., 1887, p. 229.
Meteorus coquilletti ASHMEAD, Proc. U. S. Nat. Mus., 1888, p. 642.
Meteorus mellinervis VIERECK, Trans. Amer. Ent. Soc., vol. 29, 1903, p. 95.
Meteorus mamestrae VIERECK, Proc. U. S. Nat. Mus., vol. 46, 1913, p. 364.

Type.—The types of *vulgaris* and *mellinervis* are in the Philadelphia Academy of Sciences; those of *coquilletti* and *mamestrae* are in the United States National Museum.

Easily separated from related species by the characters given in the key. The female antennae normally have 26 to 30 segments, those of the male 29 to 32; the ventral margins of the first tergite touch for a short distance, as shown in figure 2 *f*. The petiole is without dorsal fossae and is smooth and polished; the postpetiole is usually finely striate, smooth and polished between the striae; in some specimens the striae are nearly effaced, the whole first tergite being practically smooth; the ovipositor sheaths are a little more than half the length of the abdomen; the ovipositor is very strongly thickened on the basal half; in color the species is testaceous, more or less varied with black or brown; the first tergite almost invariably uniformly brown or black.

Distribution.—Evidently this is the most common and most widely distributed of all our species. Without doubt it occurs abundantly in every State of this country, over much of Canada, and in all probability in Mexico.

Hosts.—*Lycophotia margaritosa* Haworth; *L. saucia* Hübner; *Laphygma frugiperda* Smith and Abbot; *Chorizagrotis agrestis* Grote; *Chorizagrotis*, species; *Scotogramma trifolii* Rottemburg; *Paragrotis perexcellens* Grote; *Feltia subgothica* Haworth; *F. annexa* Treitschke; *F. gladiaria* Morrison; *Porosagrotis orthogonia* Morrison; *Eurymus eurytheme* Boisduval; *Agrotis ypsilon* Rottemburg; "cutworms." Material from these hosts, most of it in the United States National Museum, has been examined. The parasite has also been recorded from *Hellula undalis* Fabricius [13] and *Feltia malefida* Gueneé.[14] An important parasite of the cutworm type of noctuid larva. The species is gregarious, from 8 or 10 to 30 individuals issuing from a single caterpillar. Published host records which are probably incorrect are: *Canarsia hammondi* Riley [15] and *Omphalocera cariosa* Lederer.[16]

The foregoing discussion and the characters assigned the species in the key are based on an examination of several hundred specimens from many points in Texas, Delaware, Colorado, California, New Mexico, Arizona, Kansas, Montana, Oregon, Utah, Washington, South Dakota, Louisiana, Alabama, Georgia, Florida, Kentucky, Tennessee, Michigan, Illinois, Indiana, Pennsylvania, Virginia, Maryland, District of Columbia, New York, Vermont, Maine, New Hampshire, Massachusetts, Ontario, Nova Scotia, Alberta, British Columbia. This vast amount of material is in the collections of the United States National Museum; the Philadelphia Academy of Sciences; Cornell University; Doctor Brues, at Harvard University; Mr. Nathan Banks, of the Cambridge Museum of Comparative Zoology; the Boston Society of Natural History; and the gypsy-moth parasite laboratory.

24. METEORUS LAPHYGMAE Viereck.

Meteorus laphygmae VIERECK, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 560.

Type.—In the United States National Museum.

Very similar to *hyphantriae* and *versicolor;* but a little care in the use of the characters given in the key will separate them; the propleura are entirely rugulose, except along the upper margin; parap-

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[13] Chittenden, Bull. 23, U. S. Dept. Agr., Bur. Ent., 1900, p. 60.

[14] Sanderson, Bull. 57, U. S. Dept. Agr., Bur. Ent., 1906, p. 10.

[15] Ashmead, Proc. Ent. Soc. Wash., vol. 4, 1897, p. 130.

[16] Riley and Howard, Insect Life, vol. 3, 1890, p. 57.

sidal grooves poorly defined; the propodeum is without a petiolarea, being uniformly rugose and usually not separated from the metapleura by a conspicuous raised line; posterior face of propodeum a little hollowed out medially; antennae 30 to 33 segmented; ocell-ocular line in male usually a little longer than diameter of an ocellus, in female normally about equal to the diameter of an ocellus; first tergite polished on the petiole, finely longitudinally striate on the postpetiole, the striae converging rather strongly behind; ovipositor sheaths about half the length of the abdomen; stigma narrower than in *hyphantriae;* the first abscissa of radius nearly or quite as long as the second. A uniformly pale yellow species, at most with only weak blackish markings on the postpetiole laterally.

Distribution.—Texas.

Hosts.—*Laphygma frugiperda* Smith and Abbot; *Lycophotia margaritosa* Haworth; *Laphygma exigua* Hübner; *Feltia annexa* Treitschke; *Chloridea obsoleta* Fabricius; *Prodenia,* species; *Monodes,* species; *Eurymus eurytheme* Boisduval. Another general cutworm parasite; it is apparently solitary.

In addition to the types the United States National Museum has many specimens, all reared from the above-named hosts, at Brownsville, Texas, by R. A. Vickery, C. L. Scott, and E. G. Smyth, in the Bureau of Entomology under Webster Nos. 6446, 5738, 6481, 6476, 5740, 5751, 6437, 6455.

25. METEORUS PROXIMUS (Cresson).

Perilitus proximus Cresson, Canad. Entom., vol. 4, 1872, p. 83.
Meteorus proximus Cresson, Cresson, Synops. Hymen. N. Amer., 1887, p. 229.
Meteorus exareolatus Viereck, Bull. 22, Conn. State Nat. Hist. and Geol. Survey, 1917 (1916), p. 224.

Type.—In the Philadelphia Academy of Sciences; that of *exareolatus* is in the Connecticut Agricultural Experiment Station, at New Haven.

Much care is required to distinguish between this species and *arizonensis.* Antennae in the female 33 to 35 segmented, in the male with 34 to 37 segments; male antennae stout at base, tapering gradually to apex, the flagellum dark brown; face broader at base of clypeus than long, much broader in the male; ocell-ocular line somewhat longer than the diameter of an ocellus; propodeum coarsely evenly rugose, hollowed out behind; radial cell short, radius reaching metacarpus much before apex of wing; intercubital veins more nearly parallel than in *arizonensis,* but this alone is not a dependable character; recurrent vein always entering first cubital cell; lower abscissa of basella about equal to nervellus; first tergite exactly as in *arizonensis;* ovipositor sheaths slightly more than half the length of the abdomen, but distinctly shorter than in *arizonensis;* in color the two species agree perfectly; wings, in the male, often faintly tinted with brown.

Distribution.—Illinois, Connecticut, New York, Michigan, Massachusetts, Canada.

Host.—Unknown.

The discussion is based on the following material: The types of both *proximus* and *exareolatus;* 8 specimens from Oswego, 2 from Stony Island, and 1 from the Thousand Islands, New York, 1 from Agricultural College, Michigan, and 12 labeled "Cana. C. F. Baker Collection," in the United States National Museum; 2 in the Cornell collection, one of these from Salines, Ontario, the other from Waubamic, Ontario (H. S. Parish); 4 in the collection of the Boston Society of Natural History, 2 coming from Brookline, and 2 from Cohasset, Massachusetts; and 2 specimens in Doctor Brues's collection, from Woods Hole and Southbridge, Massachusetts.

26. METEORUS ARIZONENSIS, new species.

Very close to *proximus*, as noted in the discussion of that species, the males being especially difficult to distinguish. However, the differences mentioned in the key and under *proximus* will separate the two species.

Female.—Length, 5 mm. Head transverse; face broader at base of clypeus than long, very minutely sculptured, shining; malar space about as long as basal width of mandible; antennae 30-segmented, the segments shortened; ocell-ocular line distinctly longer than diameter of an ocellus; vertex and temples smooth and polished; mesoscutum shining, parapsidal furrows broad, not deeply impressed; mesonotal lobes very weakly punctate; propodeum evenly coarsely rugose, without prominent carinae, the posterior declivity rather abrupt and distinctly hollowed out medially; stigma rather narrow; radial cell short, the radius reaching metacarpus much before apex of wing; first abscissa of radius much shorter than the second, the latter more than half the length of first intercubitus; recurrent vein practically interstitial with first intercubitus; nervellus distinctly longer than lower abscissa of basella; posterior coxae closely punctate, more or less granular; abdomen stout; first tergite mostly smooth and polished, very finely longitudinally striate laterally on postpetiole, the striae converging strongly behind; remainder of abdomen smooth and polished; ovipositor sheaths at least two-thirds the length of the abdomen. Uniformly ferruginous; antennae ferruginous, slightly infuscated at apex; wings sometimes a little tinted with brownish; legs, including posterior tibiae and tarsi, concolorous with the body.

Male.—Like the female, except that ocelli are usually a little smaller; the malar space longer; the antennae dark brown or blackish, except the scape and pedicel beneath; and the body more or less varied with blackish, especially the lateral lobes of mesoscutum, the lateral face of scutellum, propodeum, the postpetiole and posterior coxae. These blackish markings will be found extremely variable, no doubt.

Described from five specimens, from the C. F. Baker collection labeled as follows: Type, allotype, and one paratype, "Ariz. 2551"; one paratype, "Ariz. 1856"; another paratype, "Ariz. 2522." Other material of this species in the United States National Museum, but not included in the type series, consists of one specimen labeled "N. M. 2310, C. F. Baker Collection"; one from Santa Rita Mountains, Arizona (Hubbard and Schwarz); three from Mesilla, New Mexico (Cockerell); and one from Chiric Mountains, Arizona (Hubbard).

27. METEORUS ACRONYCTAE, new species.

Easily distinguished from *euschausiae* to which it is closely related, by the shorter antennae; by the incomplete occipital carina; by the first abscissa of radius being as long as, sometimes longer than, the second; the recurrent vein entering second cubital cell; the shorter apical segment of maxillary palpi; the color markings; and the smaller size.

Female.—Length, 4.5 mm. Head transverse, descending abruptly behind the ocelli; temples receding unusually strongly; occipital carina practically effaced for a short distance in the middle; malar space nearly as long as basal width of mandible; last segment of maxillary palpi distinctly shorter than the preceding segment; face as broad at base of clypeus as long, minutely sculptured, shining; antennae 30-segmented; first and second flagellar segments about equal; vertex and temples polished; ocell-ocular line about equal to diameter of an ocellus. Thorax stout, as broad as the head; mesonotal lobes not prominent, somewhat flattened, rather opaque; parapsidal grooves crenulate, not deep; disk of scutellum strongly convex, polished; propodeum rugoso-reticulate, short, the dorsal face unusually short, the posterior face very abrupt and strongly hollowed out medially; pro- and mesopleura mostly smooth and shining; metapleura finely rugulose; recurrent vein entering second cubital cell; first abscissa of radius as long as the second and longer than nervulus; last abscissa of radius a little shorter than last abscissa of cubitus and reaching wing margin much before apex of wing; posterior coxae a little roughened on outer face; abdomen short and stout; first tergite without fossae on the petiole, the postpetiole very finely closely, longitudinally striate, the striae converging strongly behind; ventral margins of first tergite meeting for nearly half the length of the segment; remainder of abdomen smooth and polished; ovipositor sheaths projecting two-thirds the length of the abdomen. Ferruginous; antennae blackish; except the scape, which is concolorous with face; propodeum black; wings hyaline or subhyaline, stigma pale brown; legs ferruginous, posterior coxae on apical third, apical segment of posterior trochanters beneath, and apex of posterior femora and tibiae, black or blackish; all tarsi more or less infuscated; first tergite black, ferruginous at base; second tergite more or less ferruginous; remainder black.

Male.—Agrees in every way with the female; antennae are 30-segmented as in the type.

Type.—Cat. No. 24969, U. S. N. M.

Type locality.—Hell Canyon, New Mexico.

Described from six female and two male specimens reared by C. Heinrich, October 17, 1916, from a larva of *Acronycta*, species, in the Bureau of Entomology, under Hopkins, U. S. No. 13965j1. Besides the type material the United States National Museum contains a large series labeled "*Pinus ponderosa;* pars. on *Euschausia*, species, Ariz.," and two other specimens, with no labels whatever, that have cocoons pinned with them; these cocoons are very dark brown, almost black, with a little loose grayish silk. In the collection of Doctor Brues, of Harvard University, I have seen nine additional specimens of this species, from Flagstaff, Arizona. The number of segments in the female antennae, varies from 29 to 30; in the male antennae, from 29 to 31. The blackish markings vary somewhat, but apparently are more constant than usual in the species of this genus.

23. METEORUS VERSICOLOR (Wesmael).

Perilitus versicolor Wesmael, Nouv. Mém. Acad. Sci. Bruxelles, vol. 9, 1835, p. 43.

Perilitus bimaculatus Wesmael, Nouv. Mém. Acad. Sci. Bruxelles, vol. 9, 1835, p. 45.

Meteorus versicolor Wesmael, Ruthe, Berlin. Ent. Zeitschr., vol. 6, 1862, p. 45.

Meteorus versicolor, var. *bimaculatus* Wesmael, Ruthe, Berlin. Ent. Zeitschr. vol. 6, 1862, p. 47.

Meteorus decoloratus Ruthe, Berlin Ent. Zeitschr., vol 6, 1862, p. 48.

Meteorus versicolor, var. *decoloratus* Ruthe, Schmiedeknecht, Illustr. Wochenschr. f. Entom., vol. 2, 1897, p. 298.

Meteorus versicolor Wesmael, Muesebeck, Journ. Agr. Research, vol. 14, 1918, pp. 201-205.

Type.—Those of *versicolor* and *bimaculatus* are probably in the Brussels Academy of Science; that of *decoloratus* in some German museum.

Very similar to *hyphantriae*, but differs in possessing shorter antennae, which are normally 27 to 30 segmented; and in the recurrent vein always raching cubitus decidedly before the first intercubitus. The propleura are usually somewhat more regulose; the propectus is impunctate and polished; and the propodeum is usually more evenly rugulose than in *hyphantriae*, with a petiolarea rarely distinct; in color the species is extremely variable, but is usually honey yellow, more or less varied with black on the propodeum and the abdomen; the first tergite always has the petiole pale, and the postpetiole usually blackish, especially laterally.

Distribution.—Europe; New England States; New Brunswick and Nova Scotia, Canada.

Hosts.—*Euproctis chrysorrhoea* Linnaeus; *Hemerocampa leucostigma* Smith and Abbot (Muesebeck); *Notolophus antiqua* Linnaeus (Muesebeck). In Europe Schmiedeknecht[17] has recorded this parasite from *Laria v-nigrum* Müller; *Asteroscopus sphinx* Hufnagel; *Bombyx neustria* Linnaeus; *B. lanestris* Linnaeus; *Triphaena pronuba* Linnaeus; *Geometra papilionaria* Linnaeus; *Eupithecia exiguata* Hübner; and *Argyresthia nitidella* Fabricius. It is quite probable that some of these records are the result of a misidentification of the parasite.

A large amount of material, both European and North American, reared at the gipsy-moth parasite laboratory, at Melrose Highlands, Massachusetts, furnishes the basis for the above notes. The species was originally introduced into Massachusetts to assist in the control of the brown-tail moth; and at present its distribution on this continent is apparently coextensive with that of its primary host.

29. METEORUS EUSCHAUSIAE, new species.

Closely related to *acronyctae*, and frequently reared from the same collection of larvae. It can readily be separated, however, as pointed out in the description of *acronyctae*.

Female.—Length 5.3 mm. Head transverse; face slightly broader at clypeus than long, finely transversely sculptured; malar space shorter than basal width of mandible; last segment of maxillary palpi distinctly longer than the preceding segment, sometimes much longer; clypeus prominently convex; temples strongly receding; antennae 34-segmented in type; first flagellar segment less than three times as long as thick; vertex and temples polished; ocell-ocular line scarcely longer than diameter of an ocellus; thorax stout; mesonotal lobes finely punctate, shining; rather flat; parapsidal grooves distinct, but not deep; the lateral lobes not meeting posteriorly, separated at apical margin of scutum by a broad, roughened, depressed area; disk of scutellum very prominently elevated; propodeum sloping gradually from base to apex, regularly rugoso-reticulate; propleura punctate, finely crenulate in the drepession, shining; mesopleura smooth and shining, very weakly punctate below, without a distinct crenulate furrow; metapleura only weakly punctate, shining; first abscissa of radius about two-thirds the length of the second; last abscissa of radius reaching margin of wing much before

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[17] Illus. Wochnschr. Ent., vol. 2, 1897, pp. 221-223.

the apex; recurrent vein usually interstitial with first intercubitus; radiellan cell gradually narrowing toward apex of wing; nervellus nearly twice as long as lower abscissa of basella; posterior coxae coarsely roughened on outer face; abdomen stout beyond first segment; first tergite without fossae on the petiole, finely striate on the postpetiole, the striae converging strongly behind; ventral margins of first tergite joined nearly to the middle of the segment; second and following tergites smooth and polished; ovipositor sheaths one-half the length of the abdomen. Ferruginous; antennae ferruginous at base, blackish on apical half; propodeum blackish; wings hyaline, stigma dark brown behind, pale brown along anterior margin; posterior coxae blackish above at apex; posterior tibiae near base and at apex, and the posterior tarsi, dusky; spurs of posterior tibiae blackish; abdomen ferruginous, except the postpetiole, which is blackish laterally.

Male.—Agrees very well with the female, except as follows: Antennae 35-segmented, the flagellum entirely black or blackish; ocell-ocular line distinctly longer than diameter of an ocellus; and the malar space as long as the basal width of mandible.

Type.—Cat. No. 24970, U.S.N.M.

Type locality—Cheyenne Mountain, Colorado.

Described from 13 female and 1 male specimens reared from *Euschausia ingens* Hy. Edwards, by G. Hofer, May 27–June 10, 1916. It is evidently a solitary parasite. The cocoons are dark brown covered with a little loose grayish silk. Besides the type series the United States National Museum contains 20 specimens from Mexico; 2 from San Francisco Mountains, Arizona; 4 from Flagstaff, Arizona; and 3 labeled "*Euschausia; Pinus ponderosa;* Ariz." Doctor Brues's collection has 10 specimens from Flagstaff, Arizona. The female antennae are usually 33-segmented, while those of the males have usually 35 segments. The color characters are relatively very constant in this species.

30. METEORUS DATANAE, new species.

Very similar to *hyphantriae*, but differing from that species in the smoother and broader face, the longer malar space, the usually stouter postpetiole and the slightly shorter ovipositor.

Female.—Length 4.5 mm. Head transverse, temples strongly receding; face a little broader at base of clypeus than long, very minutely roughened; clypeus very prominent; malar space about equal to basal width of mandibles; antennae slender, 34-segmented; ocell-ocular line slightly longer than greatest diameter of a lateral ocellus; mesonotal lobes smooth and shining with only scattering shallow punctures; parapsidal furrows present but not deeply impressed, and terminating in a large ruguloso-reticulate area which extends to extreme apical border of scutum; scutellum broad at base, strongly convex, with a few minute punctures; propodeum rather evenly ruguloso-reticulate; propleura shining, slightly crenulate in the depression; mesopleura smooth and polished on upper half, finely granularly rugulose in the broad depression on lower half; metapleura opaque, granular or rugulose; wings almost identical with those of *hyphantriae;* first abscissa of radius much shorter than second, but more than half as long; stigma is apparently very slightly narrower and radial cell slightly shorter than in *hyphantriae;* legs slender; posterior coxae more or less roughened above and somewhat punctate on outer face; abdomen about as long as head and thorax united, strongly petiolate; first segment with postpetiole broad, the distance between spiracles more than half the distance from spiracles to apex of segment; postpetiole shining, striate, the striae converging more or less posteriorly; remainder of abdomen smooth and polished; ovipositor sheaths about half as long as abdomen. Ferrugino-testaceous; antennae dark brown, flagellum much darker than scape; propodeum with blackish markings basally on either side; postpetiole somewhat dusky laterally; wings hyaline, the stigma more or less brown behind, darker than usual in *hyphantriae;* posterior tibiae yellowish, with a conspicuous blackish annulus near base and the apical fifth black.

Type.—Cat. No. 25413, U.S.N.M.

Type locality.—Somerville, New Jersey.

Hosts.—*Datana integerrima* Grote and Robinson; *D. ministra* Drury; *D. angusii* Grote and Robinson.

Described from five female specimens reared in August, 1921, in the Bureau of Entomology, under gypsy moth laboratory Nos. 11744a5 and 11734a7, by R. T. Webber.

In addition to the type series which has been deposited in the United States National Museum I have seen four other female specimens; one, taken by H. M. Parshley at Orono, Maine, is in the collection of Dr. C. T. Brues, of Harvard University; two are in the collection of the gypsy-moth parasite laboratory, at Melrose Highlands, Massachusetts; one of these was reared from *Datana integerrima* at Reddington, New Jersey, under gypsy moth laboratory No. 11744a3; the other was reared from *D. angusii* taken at South Brunswick, New Jersey, under gypsy moth laboratory No. 12175g1; and one specimen reared from *Datana ministra*, at Overbrook, Pennsylvania, is in the collection of Bureau of Plant Industry at Harrisburg, Pennsylvania.

While it is possible that this is only a form of the variable *hyphantriae,* it is sufficiently constant in the characters in which it differs from that species to warrant holding it distinct, for the present.

31. METEORUS HYPHANTRIAE Riley.

Meteorus hyphantriae Riley, Rep. Entom. U. S., 1886, p. 532, pl. 10, fig. 4.
Meteorus oecopsidis Ashmead, Proc. U. S. Nat. Mus., 1888, p. 642.
Meteorus floridanus Ashmead, Proc. U. S. Nat. Mus., 1888, p. 642.
Meteorus relativus Viereck, Trans. Kansas Acad. Sci. for 1903–04, vol. 19, 1905, p. 280.
Meteorus triangularis Muesebeck, Canad. Entom., vol. 51, 1919, p. 115.

Type.—The types of *hyphantriae*, *oecopsisis*, *floridanus*, and *triangularis* are in the United States National Museum; that of *relativus* is in the University of Kansas.

Little difficulty should be experienced in determining specimens of this species by means of the foregoing key. However, *hyphantriae* exhibits extreme variability with respect to many characters, and one reared series may differ quite markedly in appearance from another; a close examination of all essential characters will be necessary to identify the two as the same species. The face, especially in the female, is very narrow, and is finely transversely roughened; the malar space is very short in the female, and very rarely in the male is it nearly as long as the basal width of mandible; antennae with 32 to 38 segments, usually with 32 to 35; lateral face of scutellum nearly always with the posterior transverse polished area rather broad; propodeum rugoso-reticulate, a petiolarea usually more or less distinct; recurrent vein usually interstitial with the first intercubitus, occasionally entering the extreme posterior angle of the second cubital cell, very rarely, in the male, going into the first cubital cell; nervellus practically always slightly longer than lower abscissa of basella; the first tergite without fossae on the petiole, and with the postpetiole longitudinally striate, the striae often straight; ovipositor sheaths a little more than half the length of the abdomen. Testaceous, more or less marked with black; antennae nearly always testaceous; propodeum and postpetiole usually blackish; the second tergite usually spotted with black laterally, and the following tergites sometimes more or less blackish.

Distribution.—Widely distributed over the entire United States and Canada.

Hosts.—*Hyphantria cunea* Drury; *H. textor* Harris; *Malacosoma americana* Fabricius (F. M. Webster and J. V. Schaffner); *M. disstria* Hübner (H. L. Viereck); *Drasteria erechtea* Cramer (S. Blum); *Meliana albilinea* Hübner (C. N. Ainslie); *Euschausia argentata* Packard; *Hemileuca maia* Drury (C. Heinrich); *Paleacrita vernata* Peck (B. A. Porter); *Alsophila pometaria* Harris (B. A. Porter); *Perispasta caeculalis* Zeller; (*Oecopsis*) *Olethreutes*, species (Ashmead); *Hemerocampa leucostigma* Smith and Abbot.

The material from which the above host records were taken is in the United States National Museum, and the gipsy-moth parasite laboratory, with the exception of the type of *relativus*, recorded as a probable parasite of *Malacosoma disstria* by Viereck in his description. Localities represented by this large amount of material include many points in District of Columbia, Missouri, Florida, Massachusetts, North Carolina, Maryland, West Virginia, Indiana, Michigan, New Jersey, Connecticut, Arkansas, New Mexico, Oregon, Nova Scotia. Other specimens, in the collections of Cornell University, the Boston Society of Natural History, of Doctor Brues at Harvard University, and of Mr. Nathan Banks at the Museum of Comparative Zoology, Cambridge, Massachusetts, are from localities in New York, New Hampshire, Maine, Rhode Island, Virginia, California, Quebec.

A careful study of the types of *hyphantriae*, *oecopsidis*, *floridanus*, and *triangularis* has led me to regard all as the same species; and Mr. Gahan's notes on the type of *relativus*, together with the original description, make practically certain the identity of this species with *hyphantriae*. In his description of *relativus* Viereck stated that the antennae were 23-segmented. This was undoubtedly a typographical error. Dr. S. J. Hunter of Kansas University has very kindly had the type examined, and writes me that it has 33-segmented antennae.

SPECIES TRANSFERRED TO THIS GENUS, BUT EITHER UNRECOGNIZABLE, OR BELONGING ELSEWHERE.

METEORUS VITTICOLLIS (Holmgren).

Saprotichus vitticollis HOLMGREN, Eugenies Resa Insect., 1868, p. 431.

Meteorus vitticollis Holmgren, SZEPLIGETI, Genera Insectorum, fasc. 22, 1904, p. 180.

Type.—Doubtless in a European collection.

While the original description is extensive many important characters are not discussed, and I have found it impossible to place this species in the key. Quite probably it will fall near *trachynotus*, which it resembles in having the first and second abscissae of radius about equal, in the prominent mesonotal lobes, and to a considerable degree, in color; however, the long malar space would ally it more closely with *terebratus*.

Distribution.—California.

Host.—Unknown.

EPHEDRUS INCOMPLETUS (Provancher).

Perilitus incompletus PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 126.
Ephedrus incompletus PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 156.
Scotioneurus dives PROVANCHER, Addit. faun. Canad. Hymen., 1886, p. 157.
Meteorus incompletus Provancher, CRESSON, Synops. Hymen. N. Amer., 1887, p. 228.
Ephedrus incompletus Provancher, GAHAN, Bull. 152, Md. Agr. Exp. Sta., 1911, p. 159.

Type.—In the Museum of Public Instruction in Quebec, Canada. On an examination of the type of *Perilitus incompletus* Mr. A. B. Gahan, of the Bureau of Entomology, found it to be the same species described by Provancher a little further on in the same volume as *Ephedrus incompletus* and again as *Scotioneurus dives.*

The correct position of this species is included in the present paper at the suggestion of Mr. Gahan.

HOST LIST.

COLEOPTERA.

Orchesia castanea Melsheimer	*Meteorus humilis* (Cresson).
	terebratus Muesebeck.
Platydema ellipticum Fabricius	*humilis* (Cresson).

LEPIDOPTERA.

Acrobasis betulella Hulst	*Meteorus indagator* (Riley).
caryae Grote	*indagator* (Riley).
caryivorella Raganot	*indagator* (Riley).
Acronycta, species	*acronyctae* Muesebeck.
Agrotis ypsilon Rottemburg	*vulgaris* (Cresson).
Alsophila pometaria Harris	*autographae* Muesebeck.
	hyphantriae Riley.
Ancylis comptana Frölich	*trachynotus* Viereck.
Ancylis, species	*trachynotus* Viereck.
Ania limbata Haworth	*trachynotus* Viereck.
Autographa brassicae Riley	*autographae* Muesebeck.
Autographa, species	*autographae* Muesebeck.
Cacoecia argyrospila Walker	*trachynotus* Viereck.
Chloridea obsoleta Fabricius	*laphygmae* Viereck.
Chorizagrotis agrestis Grote	*vulgaris* (Cresson).
Cirphis unipuncta Haworth	*communis* (Cresson).
	autographae Muesebeck.
Datana angusii Grote and Robinson	*datanae* Muesebeck.
integerrima Grote and Robinson	*datanae* Muesebeck.
ministra Drury	*datanae* Muesebeck.
Desmia funeralis Hübner	*dimidiatus* (Cresson).
Dioryctria xanthaenobares Dyar	*indagator* (Riley).
Drasteria erechtea Cramer	*hyphantriae* Riley.
Euproctis chrysorrhea Linnaeus	*versicolor* (Wesmael).
Eurymus eurytheme Boisduval	*autographae* Muesebeck
	laphygmae Viereck.
	vulgaris (Cresson).

Euschausia argentata Packard	*Meteorus hyphantriae* Riley.
ingens Hy. Edwards	*euschausiae* Muesebeck.
Euschausia, species	*acronyctae* Muesebeck.
Evergestis straminalis Hübner	*autographae* Muesebeck
Feltia annexa Treitschke	*laphygmae* Viereck. *vulgaris* (Cresson).
gladiara Morrison	*vulgaris* (Cresson).
malefida Guenée	*vulgaris* (Cresson).
subgothica Haworth	*vulgaris* (Cresson).
Graptolitha laticinerea Grote	*communis* (Cresson).
Graptolitha, species	*communis* (Cresson). *hyphantriae* Riley.
Hadena procincta Grote	*communis* (Cresson).
Harmologa fumiferana Clemens	*trachynotus* Viereck.
Hellula undalis Fabricius	*vulgaris* (Cresson).
Hemerocampa leucostigma Smith and Abbot	*hyphantriae* Riley. *versicolor* (Wesmael).
Hemileuca maia Drury	*hyphantriae* Riley.
Hyphantria cunea Drury	*bakeri* Cook and Davis. *hyphantriae* Riley.
textor Harris	*bakeri* Cook and Davis. *hyphantriae* Riley.
Laphygma exigua Hübner	*laphygmae* Viereck.
frugiperda Smith and Abbot	*autographe* Muesebeck. *laphygmae* Viereck. *vulgaris* (Cresson).
Loxostege sticticalis Linnaeus	*loxostegei* Viereck.
Lycophotia margaritosa Haworth	*laphygmae* Viereck. *vulgaris* (Cresson).
saucia Hübner	*vulgaris* (Cresson).
Malacosoma americana Fabricius	*communis* (Cresson). *hyphantriae* Riley.
disstria Hübner	*hyphantriae* Riley.
Meliana albilinea Hübner	*hyphantriae* Riley.
Mineola indiginella Zeller	*indagator* (Riley).
juglandis LeBaron	*indagator* (Riley).
Monodes, species	*laphygmae* Viereck.
Notolophus antiqua Linnaeus	*versicolor* (Wesmael).
Olethreutes, species	*hyphantriae* Riley.
Paleacrita vernata Peck	*hyphantriae* Riley.
Paragrotis perexcellens Grote	*vulgaris* (Cresson).
Perispasta caeculalis Zeller	*hyphantriae* Riley.
Phlyctaenia ferrugalis Hübner	*autographae* Muesebeck.
Plathypena scabra Fabricius	*autographae* Muesebeck.
Porosagrotis orthogonia Morrison	*vulgaris* (Cresson).
Prodenia eridania Cramer	*autographae* Muesebeck.
Prodenia, species	*laphygmae* Viereck.
Pyrausta futilalis Lederer	*loxostegei* Viereck.
nubilalis Hübner	*loxostegei* Viereck.
Scotogramma trifolii Rottemburg	*vulgaris* (Cresson).
Tetralopha platanella Clemens	*indagator* (Riley).
subcanalis Walker	*indagator* (Riley).
Tinea oregonella Busck	*humilis* (Cresson).
Wilsonia, species	*trachynotus* Viereck.

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The following index includes the species of *Meteorus* treated in this paper. Accepted generic names are in bold face, accepted specific names in roman, synonyms in italics.

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THREE NEW TREMATODES FROM AMPHIUMA MEANS.

By Asa C. Chandler,
Of the Biological Laboratory, Rice Institute, Houston, Texas.

Early in May, 1922, a single large male specimen of *Amphiuma means* received from Louisiana was examined for parasites, and found to contain, in addition to five or six specimens of a nematode, presumably *Filaria amphiumae*, encysted in the walls of the digestive tract, three species of flukes, all of which proved to be new species. It is interesting to note that one of the species, *Telorchis stunkardi*, new species, belongs to a genus which has hitherto not been known to occur in hosts other than reptiles; another, *Cephalogonimus amphiumae*, new species, belongs to a genus which is represented in both reptiles and amphibians; and the third, *Megalodiscus americanus*, new species, belongs to an entirely new genus, the nearest relatives of which are found in fishes and amphibians. Each species of fluke was found to occupy a particular portion of the digestive tract. *Cephalogonimus amphiumae* was found in about the third fourth of the digestive tract, intermingling in the posterior portion of its habitat with *Telorchis stunkardi*. Specimens of the latter occurred chiefly in the fourth fifth of the digestive tract. Of the third species, *Megalodiscus americanus*, only three specimens were found, all of them located in the rectum near the cloaca.

CEPHALOGONIMUS AMPHIUMAE, new species.

Plate 1, fig. 1.

Diagnosis.—Body 4.4 to 5.3 mm. in length, with a maximum width of from 1.22 to 1.3 mm., ovoid, flattened, widest in the third fifth of the body length, tapering thence toward both ends, which are bluntly rounded. Cuticle thickly covered with minute spines anteriorly, these becoming less numerous posteriorly, and absent entirely from the posterior third. Oral sucker 0.42 to 0.43 mm. in diameter, larger than the ventral sucker, which measures, when round, from 0.368 to 0.38 mm. in diameter. Center of ventral sucker about 1.2 mm., two-sevenths of body length, from anterior end. Pharynx about 0.192 mm. in diameter, preceded by a short prepharynx and

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followed by a barely distinct esophagus, the distance from the posterior border of the pharynx to the inner border of the intestinal ceca about one and one-half times diameter of ceca. Intestinal ceca long and not quite equal, the left one longer, reaching to about one-tenth of body length, the right one to one-fifth, from posterior end.

Ovary, from 0.32 to 0.36 mm. in diameter, situated just behind ventral sucker and partially overlapping it, slightly displaced toward right side, its center 1.5 mm., or about one-third of body length, from anterior end. A flask-shaped seminal receptacle lies just posterior to the ovary, also toward the right side, occupying the space between ovary and anterior testis. Ootype and shell gland not clearly visible, since they are covered ventrally by the seminal receptacle and dorsally by the egg-filled coils of the uterus. Transverse vitelline ducts receive anterior and posterior forks on either side, in region of intestinal ceca. Vitelline glands on left side more extensive than on right, extending from a level just behind anterior border of ventral sucker to level of posterior border or posterior testis on right side, and to junction of second and terminal thirds of body on left side. Uterus, irregularly coiled and filled with very numerous eggs, passes posteriorly from the ootype on the left side in three specimens, on the right in one, crosses to the opposite side usually at some distance from the posterior end, although loops pass back to the extreme tip, and ascends, crossing diagonally back to the left side, if not already there, in the region of the testes, continuing forward a little to the left of the midline to the anterior border of the ventral sucker, thence following the cirrus sac to the genital papilla at the extreme anterior end. Testes nearly round, one directly behind the other in median line, and in contact or nearly so; anterior one about 0.41 to 0.48 mm. in diameter, posterior one about 0.39 to 0.47 mm. Cirrus sac long and flask-shaped, its posterior end, at level of ventral sucker, bending toward the dorsal side. It crosses diagonally under the left intestinal cecum and, becoming narrow, turns forward, inward, and dorsad to open, in common with the vagina, on a papilla at the antero-dorsal extremity of the worm. Excretory system with thick muscular walls around pore, into which opens a broad reservoir. Eggs thick-shelled, yellow, relatively small; in mounted specimens, where they are more or less collapsed, they measure about 26μ by 13μ.

Habitat.—Middle portion of intestine of *Amphiuma means*, from Louisiana.

Type.—Deposited in United States National Museum, Helminthological Collections, No. 25171.

Cephalogonimus amphiumae is a typical representative of its genus. Including the present species, seven species have now been described in the genus, but one, *Cephalogonimus trachysauri* Mac-

Callum 1921 differs in so many features of its anatomy from other members of the genus that it should undoubtedly be placed in a new genus, and two others, *C. retusus* (Dujardin) and *C. europaeus* Blaizot 1910, from *Rana esculenta* in Europe, are probably identical. The type species, *C. lenoiri*, was described by Poirier from a turtle, *Tetrathyra vaillantii*, from Senegal. Two American species have heretofore been described, one, *C. americanus*, by Stafford (1902) from the intestine of *Rana virescens* and *R. clamitans* in Canada, the other, *C. vesicaudus*, by Nickerson (1912) from the intestines of soft-shelled turtles, *Aspidonectes* and *Amyda*, in Minnesota. Both *C. americanus* and *C. vesicaudus* differ from the type species and from *C. restusus* in having the testes arranged in an oblique manner instead of one directly behind the other; *C. amphiumae* agrees with the type species in this respect. The ovary of *C. amphiumæ* is situated much nearer the median line of the body than that of any of the other species. This species also differs from all the others in the more anterior position of the acetabulum and genital glands, and in the fact that the vitellaria do not extend forward beyond the anterior margin of the acetabulum. In addition to these differences it is of larger size than any of the other described species, and has a relatively larger pharynx. It resembles *C. americanus* in having the oral sucker a little larger than the acetabulum, but differs in having the genital opening situated on an anterior papilla instead of being at some distance from the anterior end, on the dorsel side. The very short, almost negligible esophagus is intermediate between the condition found in *C. lenoiri*, *C. retusus*, and *C. americanus* on the one hand, and *C. vesicaudus* on the other.

TELORCHIS STUNKARDI, new species.

Plate 1, fig. 2.

Diagnosis.—Body 4 to 5 mm. in length, with maximum width of 0.58 to 0.64 mm. Sides nearly parallel, but the body tapers slightly in its posterior half, both ends bluntly rounded. Cuticle spiny anteriorly to about level of ventral sucker. Oral sucker about 0.215 mm. in diameter. Ventral sucker, at junction of first and second fourths of body, relatively very large, 0.356 to 0.288 mm. in diameter. Pharynx, preceded by a short prepharynx, also large, 0.096 to 0.106 mm. in diameter. Esophagus variable, 0.17 to 0.23 mm. in length. Intestinal ceca reach almost to posterior end of body.

Ovary spherical, 0.17 mm. in diameter, at junction of third and fourth sevenths of body length, with shell gland and ootype immediately behind it. Descending and ascending uterine coils to left and right sides, respectively, but overlapping considerably; metraterm broad, almost straight, extending about two-fifths of distance from genital pore to ovary. Vitelline glands in distinct lobes, 10 on the right side and 9 on the left, on left side extending from midway between ventral sucker and ovary to about the beginning of the terminal fourth of the body, on right side extending farther anteriorly, to a point two-thirds the distance from ovary to ventral sucker. Testes in contact with each other, the posterior one a little more than its own diameter from posterior end; transverse diameters slightly greater than longitudinal. Posterior testis from 0.225 by 0.256 mm. to 0.256 by 0.32 mm.; anterior testis variable, smaller than posterior one, in some specimens very markedly so, from 0.144 by 0.192 mm. to 0.224 by 0.288 mm. Cirrus sac very long, extending in an open spiral from genital pore to ovary; about 0.106 mm. in diameter posteriorly. Excretory system typical. Eggs 42 to 45μ by 18 to 20μ, as measured from more or less collapsed eggs in preserved specimens.

Habitat.—Posterior portion of intestine of *Amphiuma means*, from Louisiana.

Type.—Deposited in United States National Museum, Helminthological Collections, No. 25170.

Telorchis stunkardi is of particular interest in being the only species of its genus, of which about 24 species are known, which occurs in an amphibian, all of the others being confined to reptiles. The species is, however, a typical representative of the genus. Both the oral and ventral suckers are of unusual size, in fact are relatively larger than in any other species of the genus. Another interesting and unusual characteristic is the tendency for the anterior testis to vary in size. In all specimens it is distinctly smaller than the posterior testis, and in some individuals very markedly so. In the majority of the species of the genus the testes are of approximately equal size, while in *T. ercolanii* the anterior one is larger. In respect to extent of intestinal ceca, presence of esophagus and prepharynx, position of genital glands and acetabulum, and general location of vitellaria, it agrees fairly closely with *T. nematoides*, described from *Tropidonotus natrix* in Europe, but in shape of body, in extent and lobulation of vitellaria, and in arrangement of uterine coils, it more closely resembles *T. aculeatus*, described from *Testudo* in Europe and said by Stunkard (1917) to occur in *Tropidonotus grahamii* in America.

MEGALODISCUS, new genus.

Body conical or horn-shaped, round in cross section. Oral sucker large, with a pair of well-developed pharyngeal pockets with common median wall. Posterior sucker, facing postero-ventrally, extremely large, its diameter considerably greater than that of rest of body, shallow, with raised rim and raised center, in the middle of the latter a circular cleft into which projects a plug. Esophagus opens into oral sucker on ventral side anterior to the pharyngeal pockets, turns posteriorly and then dorsally, curving around the pharyngeal pockets posteriorly. Wall of esophagus thick and muscular, the musculature becoming much thicker near the point of origin of intestinal ceca, but not forming a sharply defined esophageal bulb. Testes two, very large, globular, one behind the other in middle of ventral part of body. Ovary small, posterior, dorsal. Shell gland immediately posterior to ovary. Laurer's canal opens at level of ovary. Vitellaria in the form of distinct follicles arranged in a curved and largely transverse manner in posterior part of body. Cirrus pouch small, uterus joining with sperm duct just distal to it, forming a short hermaphroditic duct. No sucker around genital pore. Excretory system opens near posterior end of body on middorsal line, and enlarges into a reservoir posterior to ovary and shell gland. Eggs large, thin shelled.

Type of the genus.—*Megalodiscus americanus*, new species.

Habitat.—Rectum of *Amphiuma means*, North America.

The striking characteristics of the genus are the enormous size and peculiar structure of the posterior sucker, the form of the esophagus, the very large size of the testes, which show no tendency toward fusion, and the form and position of the vitelline follicles. In respect to the shape of the esophagus and structure of posterior sucker, *Megalodiscus* is somewhat intermediate between *Diplodiscus* and *Opisthodiscus*. It belongs to the subfamily Diplodiscinae as constituted by Cohn (1904).

MEGALODISCUS AMERICANUS, new species.

Plate 2, figs. 3–5.

Body conical, nearly round in cross section, the general shape being not unlike a curved horn with flaring mouth. Length 3.57 mm., with maximum diameter, before flaring out at junction of huge posterior sucker, of about 0.98 mm. Posterior sucker an enormous shallow disk, facing postero-ventrally, 1.7 mm. in diameter, nearly one and three-fourths times the diameter of the body. Sucker has raised rim and raised center, but in middle of central prominence is a relatively small circular cleft filled with a plug; this structure being reminiscent of the yolk plug of a frog's egg (fig. 5). The central plug shows no evidence of a terminal sucker such as is described by Cohn (1904) for *Opisthodiscus*. Oral sucker large and powerful, about 0.45 mm. in depth and 0.28 mm. in diameter at its anterior end. Pharyngeal pockets large and conspicuous, with common median wall, about 0.235 mm. long. Esophagus leaves oral sucker on ventral side, between and anterior to the pharyngeal pockets, turns posteriorly and then dorsally behind the pockets, widening out into a rather elongate and not sharply defined esophageal bulb from the right and left sides of which the broad intestinal ceca emerge. Entire esophagus thick-walled and well supplied with muscles. Intestinal ceca, considerably greater in dorso-ventral diameter than in transverse diameter, reach almost to posterior sucker. Ovary small, median, slightly elongate, in posterior part of body, about at level of ends of intestinal ceca, on dorsal side; size about 0.26 by 0.195 mm. Ootype and shell gland, immediately followed by an enlargement of the tube which probably serves as a seminal receptacle, situated immediately behind ovary on dorsal side. Uterus coils transversely back and forth across body as it passes forward to genital opening, finally uniting with sperm duct immediately in front of cirrus pouch, and opening on the genital papilla by a short hermaphroditic duct. Laurer's canal passes a short distance anteriorly on dorsal side of uterus, opening on the middorsal surface about at the level of the middle of the ovary. Vitelline glands in form of about 18 spherical follicles on each side, quite distinct from one another, extending, along a curved line on either side from the level of the posterior testis on the ventral side, caudad, dorsad, and mediad, around the posterior ends of the intestinal ceca. A transverse vitelline duct stretches across the space between the two series of follicles, a common duct passing from this to the ootype. Testes two, somewhat irregular in shape, very large, the anterior one larger than the posterior. Anterior testis from about 0.4 to 0.5 mm. in diameter, the posterior one from 0.35 to 0.45 mm.; anterior one slightly to left and posterior one slightly to right, but almost directly one behind the other as seen in lateral view, nearer to ventral side of body. Vas deferens passes from anterior margin of posterior testis (connection with anterior testis not seen) in an antero-dorsal direction between the intestinal ceca, turns when near dorsal surface of body, and passes ventrally between intestinal ceca just posterior to esophageal bulb. This portion is considerably enlarged and serves as a seminal vesicle. Near ventral side of body sperm duct enters a small oval cirrus pouch, measuring 0.17 by 0.095 mm., through which it passes and then joins the uterus in a short hermaphroditic duct. Genital opening can be extruded from body, as shown in Figure 4, or withdrawn into a genital cloaca. Excretory pore on dorsal side, a short distance anterior to the posterior sucker. Eggs very large, about 115 to 123μ by 51 to 57μ.

Habitat.—Rectum of *Amphiuma means*, in Louisiana.

Type.—Deposited in United States National Museum, Helminthological Collections, No. 25173; paratype, No. 25172.

EXPLANATION OF PLATES.

ABBREVIATIONS.

c. s., cirrus sac.
e. p., excretory pore.
e. r., excretory reservoir.
g. p., genital pore.
l. c., Laurer's canal.
m., metraterm.
o., ovary.
oe., esophagus.
o. s., oral sucker.
ph., pharynx.
s. g., shell gland.
sp. d., sperm duct.
s. r., seminal receptacle.
t., testes.
u., uterus.
u. d., uterus, descending portion.
u. a., uterus, ascending portion.
v., vitellaria.
va., vagina.
v. d., vitelline duct.
v. s., ventral sucker.

PLATE 1.

FIG. 1. *Cephalogonimus amphiumae*, new species, ventral view. × 34.
2. *Telorchis stunkardi*, new species, dorsal view. × 34.

PLATE 2.

FIG. 3. *Megalodiscus americanus*, new species, dorsal view. × 34.
4. Same, lateral view. × 34.
5. Cross section of posterior sucker of *Megalodiscus americanus*. × 22.

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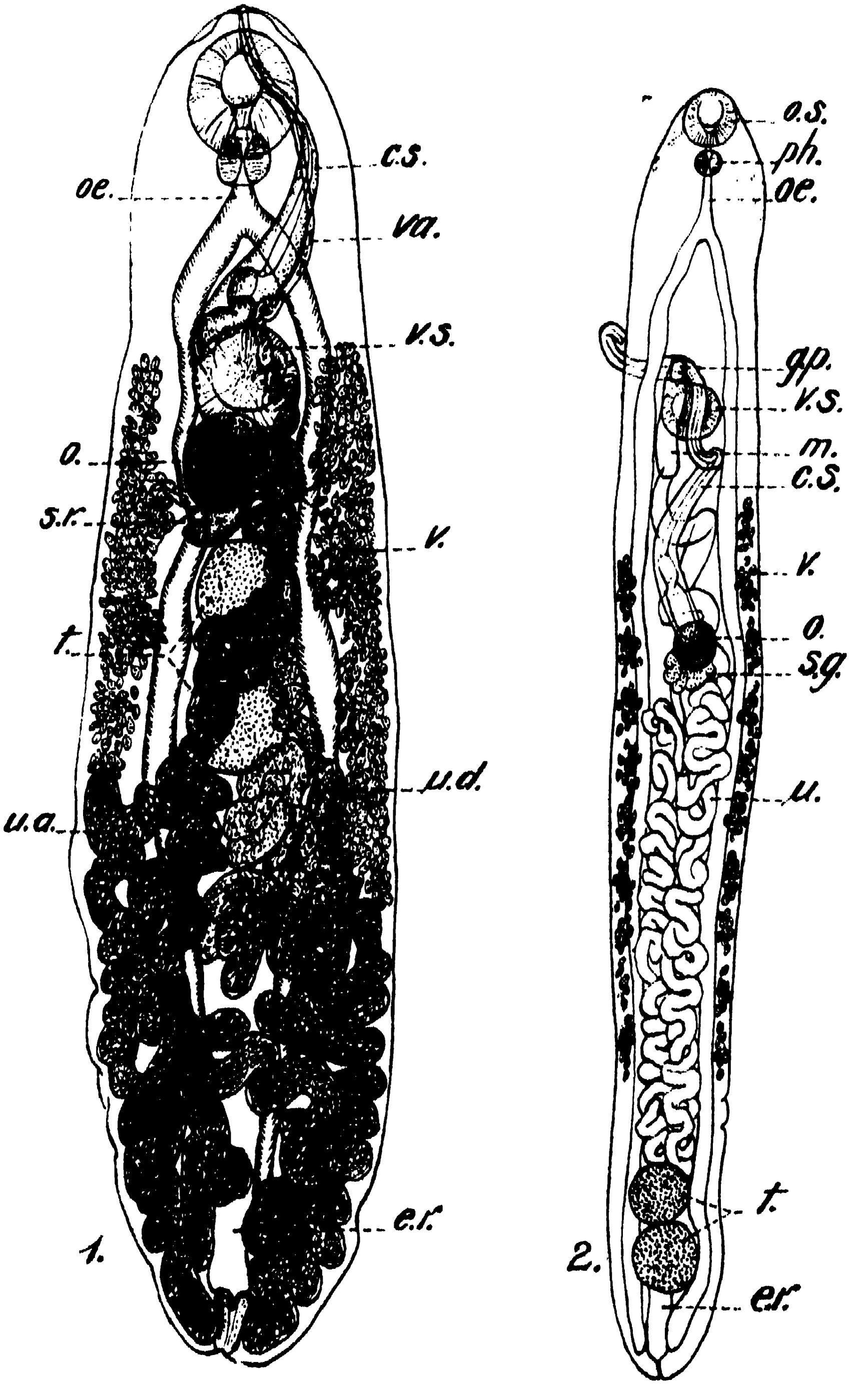
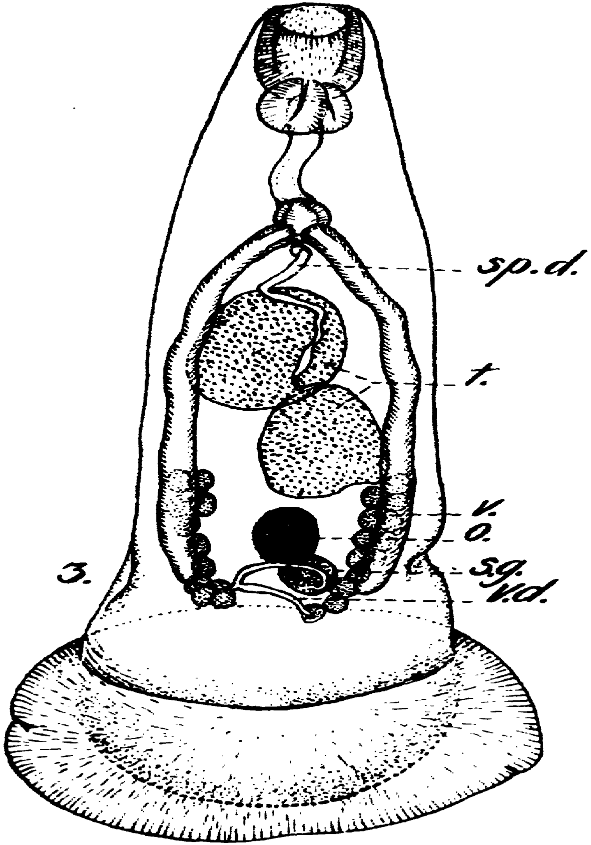


New Trematodes from Amphiuma means.



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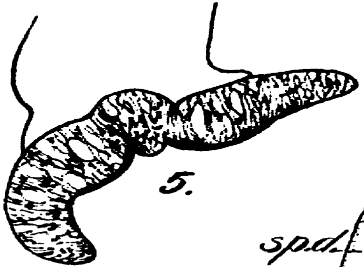

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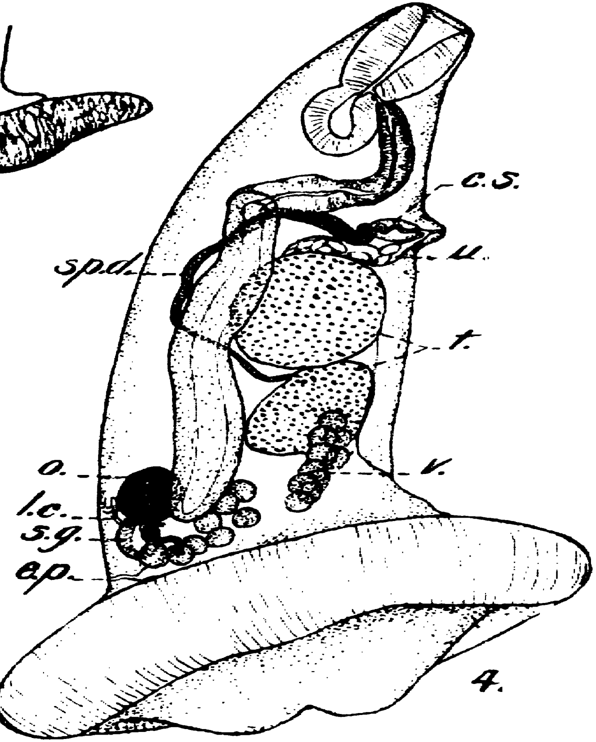

4.

NEW TREMATODES FROM AMPHIUMA MEANS.

NOTE ON ICICHTHYS LOCKINGTONI JORDAN AND GILBERT, A PELAGIC FISH FROM CALIFORNIA.

By David Starr Jordan,

Of Stanford University, California.

In the year 1880, while investigating the fish fauna of California with my colleague, Dr. Charles H. Gilbert, a very peculiar fish of uncertain family was placed in our hands. It was secured in the market of San Francisco, from off Point Reyes, by W. G. W. Harford, curator in the California Academy of Sciences, and described by us[1] as *Icichthys lockingtoni.* The specimen, in bad condition, was inadequately figured in the Oceanic Ichthyology of Goode and Bean, the figure (No. 226) being copied by Jordan and Evermann, Fishes of North and Middle America (fig. 406). The type was deposited in the National Museum (Cat. No. 27397).

In July, 1922, a second specimen 18.05 cm. (7½ inches) long, was received from a Monterey fisherman by Dr. Walter K. Fisher, director of the Hopkins Marine Station of Stanford University at Pacific Grove. This was reported as one of 8 or 10 found swimming at the surface under the disk of a large jelly fish supposed to be *Pelagia.* The fish was unknown to its captors, who saved one specimen, throwing the others away.

Of this example, 18.05 cm. (7½ inches) in length, I present a new figure and a description.

Head, 4¼ times in length to base of caudal; depth, 3⅓ times. Dorsal rays X, 32; anal rays III, 28; caudal 5–17–5; ventral rays I, 5; pectoral 18; eye 4⅓ times in head; snout 4⅓; maxillary 3⅓; caudal fin 1½ in head; pectoral fin 2⅓; ventral fin 3; scales 16–110–20; longest (posterior) dorsal ray 4; longest anal ray 4; longest (tenth) dorsal spine 4⅓.

Body oblong, moderately elongate, somewhat compressed, the caudal peduncle rather long. Head moderate, compressed, the cheeks vertical, the snout blunt, the profile convex, descending evenly; top of head with thick spongy skin; premaxillary not protractile, its tip just below level of eye; maxillary extending to opposite middle of pupil, slipping entirely under the membranous edge of the moderate preorbital, which is a little wider than pupil and with about three rows of scales; lower jaw somewhat included; jaws with minute, even, pointed teeth; slight deciduous asperities on vomer and palatines, perhaps not teeth; one toothlike appendage found in the gullet, but this and other structures are so weak and fragile that the extent of this type of dentition could not be ascertained. Eye moderate, about equal to snout; cheek long, opercle large, extremely thin and fragile, crossed by four or five rather conspicuous radiating spriae. All the bones of the head covered by very thin cycloid scales, like those on the body, but somewhat smaller; about 15 in an oblique series across cheek downward and backward from the eye.

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[1] Proc. U. S. Nat. Mus., vol. 3, 1880, p. 305.

Gill openings wide, the membranes not connected, free from the isthmus; pseudobranchiae present. Branchiostegals 7; gill rakers long and slender, about three-fourths diameter of eye. Gills 4, a short slit behind the last.

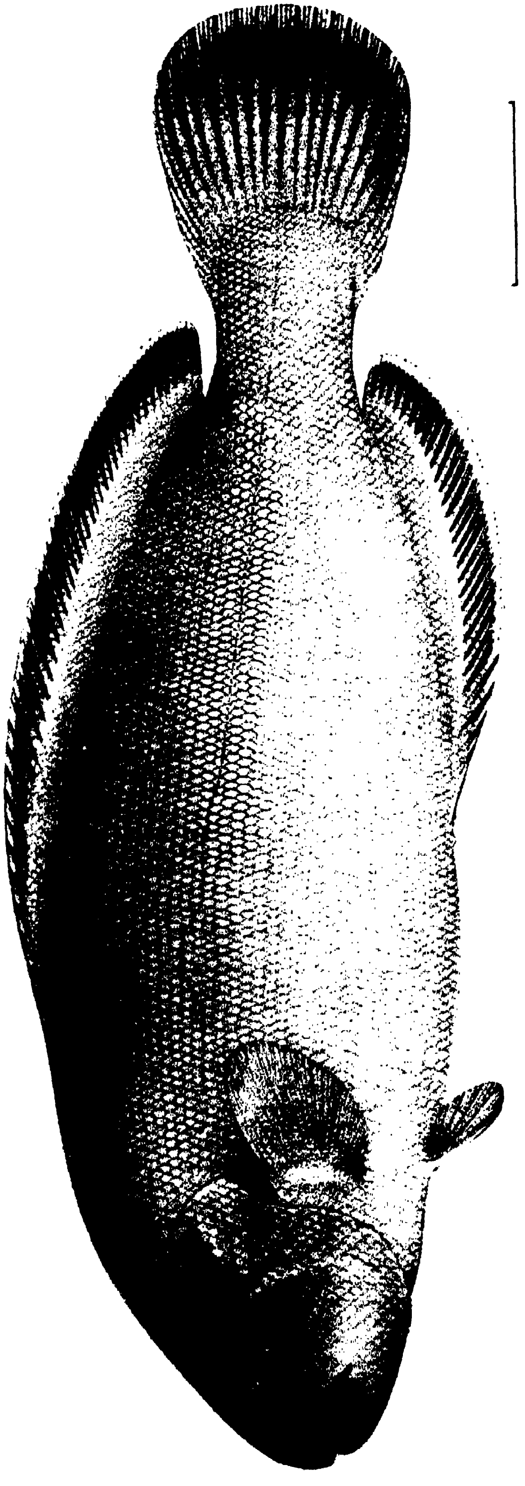
Scales very small, thin, soft and smooth, covering the body evenly, those below slightly reduced; scales extending high on the bases of each of the vertical fins. Lateral line faint, with a slight curvature behind the end of the pectoral, not extending on caudal fin.

Dorsal fin continuous, very low, rising slowly from the first (spine) to the last ray, its insertion about midway between base of ventrals and vent, its rays all very soft and slender, most of them apparently articulate, about 10 of the anterior unbranched; the spines and soft rays entirely similar. Anal like dorsal but shorter, beginning very near middle of body (without caudal) and ending just in front of last dorsal ray, its first three rays simple. Caudal fin broad, fan-shaped, rounded behind, the accessory rays numerous. (The tip of the fin is broken in both the type and the specimen now described so that its exact form is uncertain, but it can not have been forked.) Pectorals short and rounded, scaly at base; ventrals short and small, inserted below axil of pectoral, not adnate to the belly and not depressible in a groove. No spinules on any of the fins. Vent normal, close to the anal fin.

Bones of the skeleton all soft and flexible, so that the body is as limp as a wet rag, and every part very fragile. For this reason, I have not opened this example, but in the original type we found six long pyloric coeca, and no evident air-bladder.

Color everywhere dusky, the head and back with fine dark punctulations; base and margin of each of the vertical fins pale, the mesial part black; inside of mouth dark.

It is plain that this genus is allied to the Japanese genus *Icticus* and to *Schedophilus*, two pelagic genera in which the body is equally soft and limp. It is also evident that both are not far from *Centrolophus.* In the genus *Icosteus* the bones are quite as weak as in *Icichthys*, but the naked skin is thick and firm and the lateral line and the finrays are armed with prickles. We did not find gullet teeth in *Icosteus* nor in *Icticus*, but these fragile structures may have existed in either case. From the other "Rag-fishes" *Icosteus* differs widely in having but four soft rays in the ventral fin. While *Icticus* has many points in common with *Icichthys*, its dorsal fin is divided into two, as in *Nomeus*, the first being well developed. All these forms are allies of the Stromateidae, but this group seems too varied in form and structure to be placed in a single family. For the present *Icichthys* may be left with the Centrolophidae. The genus *Ectenias* Jordan and Thompson was based on a young *Coryphaena.*



CHTHYS LOCKINGTONI JORDAN AND GILBERT.

FOR EXPLANATION OF PLATE SEE PAGE 1.

DESCRIPTION OF REMAINS OF BISON OCCIDENTALIS FROM CENTRAL MINNESOTA.

By Oliver P. Hay,

Associate of the Carnegie Institution of Washington.

In the autumn of 1921 a letter was received at the United States National Museum from F. W. Uhler, chief engineer, in behalf of John A. Savage & Co., owners of the Sagamore Iron Mine, at Riverton, Minnesota. In this letter it was written that many buffalo bones had been uncovered in working their mine. The inquiry was made whether or not the United States National Museum would be interested in the discovery. Photographs enclosed in the letter showed that the bison material was valuable and also that antlers of a reindeer had been unearthed at the same place. At the request of the officers of the Museum the owners of the mine shipped and presented to the United States National Museum a large amount of bones, in fact, enough to fill trays occupying about 35 cubic feet of space. Among these bones are two practically complete skulls, several others in various stages of incompleteness, besides vertebrae, ribs, and limb bones in great numbers. However, no carpal or tarsal bones, and no bones of the feet are included. These smaller bones had been swept away by the streams of water used in removing the peat. Out of this lot of bones have been selected enough to make up a skeleton for exhibition.

The officers of the company have shown a commendable appreciation of the value of these remains and much intelligence in bringing them to the notice of the United States National Museum.

It is found that most of the skulls belong to *Bison occidentalis*, but one nearly complete skull and a good maxilla and premaxilla belong to *B. bison.*

The mine is close to the eastern bank of Mississippi River, about 10 miles northeast of Brainerd and near the town of Crosby. The surveyor's description runs thus: "Section 19, township 46, range

29." The bones were met with in a peat swamp which forms a part of the overburden of the iron ore. This peat, about 6 or 8 feet deep, was being removed by hydraulic operations and thus the bones were exposed. They were at or near the bottom of the peat.

This discovery brings to us new information regarding the time of disappearance of *Bison occidentalis*. From the remains of this species hitherto discovered, the writer had concluded that it had died out before the oncoming of the Wisconsin ice sheet. Mr. Uhler reports that underneath the peat of the bog where the bones were found there is about 30 feet of drift. On my consulting Prof. Frank Leverett about the age of this drift, he wrote as follows:

> The drift at the iron mine in section 19, township 46, range 29, near Crosby, Minnesota, is a moraine of red Wisconsin drift, of about the age of the Kalamazoo morainic system in Michigan, and the outer moraine of the Green Bay lobe in Wisconsin. It is older than the gray drift of Minnesota and younger than the Shelbyville, Bloomington, and Marseilles moraines of Illinois. It is, therefore, about mid-Wisconsin in age.

We can be certain therefore that *Bison occidentalis* lived in Minnesota until the middle of the last glacial stage. How much longer we can not now determine. Nor can we be certain just when the bones of *Bison bison* were left in that peat swamp. The two species may have lived in that region together, or the existing buffalo may have arrived there after the other species had become extinct.

It will perhaps occur to those reading this account that these animals became mired in that bog and perished. Possibly some of them did thus meet their fate; but others may have died there from other causes. It may be doubted further that more individuals died in that bog than died on an equal area of upland. In the bog, where water was always present, the bones were preserved; on the hills, they gradually dissolved into soil.

In studying the skulls the writer has taken a series of measurements in order to show the dimensions of the parts. See Table 1, page 3. In the first and second columns are measurements taken from the two complete skulls of *B. occidentalis;* in the third, fourth, and fifth columns are measurements from the injured skulls. In the sixth column are corresponding measurements of a good specimen of the existing bison (Cat. No. 22, 374, U. S. N. M.). In the seventh are similar measurements of a specimen of the European bison, *Bison bonasus* (Cat. No. 11, 514 U. S. N. M.). In an eighth column are measurements derived from a very complete skull of *Bison alleni* found in Alaska (Cat. No. 7706 U. S. N. M.). This specimen was described by the writer in 1913.[1]

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[1] Proc. U. S. Nat. Mus., vol. 46, pp. 182–192, pls. 16, 17, text figs. 7–9.

TABLE I.

[Measurements in millimeters.]

Dimensions.	*Bison occidentalis.*				*Bison bison.*		*Bison bonasus.*	*Bison alleni.*
	10541	10542	10545	10546	10544	22374	11514	7706
	1	2	3	4	5	6	7	
1. Length from rear of condyle to front of premaxillae	500	545	......	......	......	495	526	600
2. Length from front of foramen magnum to front of premaxillae (basal length)	472	505	......	......	......	465	483	560
3. Length from occipital crest to front of premaxillae	518	572	......	......	......	500	538	620
4. Length from occipital crest to rear of nasals	232	270	250	262	237	225	268	267
5. Length from occipital crest to front of nasals	470±	472	......	......	......	412	440	512
6. Length from occipital crest to line joining rear of orbits	195	233	202	215	202	190	208	232
7. Length from front of premaxillae to line joining rear of orbits	350	363	......	......	......	335	356	404
8. Length from front of foramen magnum to rear of hard palate	185	195	......	......	190	187	190	230
9. Length from lower border of foramen magnum to rear of nasals, basinasal length	262	272	268	......	260	250	275	295
10. Height of occipital crest from lower border foramen magnum	145	142	146	......	138	150	136	111
11. Greatest width at process just above ear opening	265	275	280	......	252	260	243	282
12. Width on maxillary ridges midway between maxillomalar suture and rough eminence	172	182	......	......	182	190	176	200
13. Width at hinder ends of temporal fossae	170	182	183	180	146	162	187	190
14. Width between bases of horn-cores	327	355	338	335	292	309	310	310
15. Width at constriction between bases of horn-cores and orbits	280	302	298	295	258	248	265	286
16. Width at articulations of lower jaws	246	258	260	......	......	225	230	253
17. Width at rear of orbits	328	355	330	343	310	305	325	333
18. Width at front of orbits	272	295	272	......	247	248	242	268
19. Width on maxillary ridge at maxillomalar suture	193	205	190	......	202	196	195	212
20. Width from outside to outside of nasals, straight, greatest	100	110	105	105	97	96	88	103
21. Diameter of orbit, fore-and-aft	70	70	68	......	70	72	75	78
22. Diameter of orbit, vertical	70	65	70	......	66	65	65	75
23. Height of skull from palate to rear of nasals	172	180	......	......	166	165	158	185
24. Diameter of base of horn-cores, fore-and-aft	91	105	99	90	77	80	76	97
25. Diameter of base of horn-cores, vertical	94	102	96	86	75	74	73	93
26. Circumference of base of horn cores	294	316	305	290	233	245	250	340
27. Length of horn-core on upper curve	263	280	332	262	190	190	230	430
28. Length of horn-core on lower curve	318	340	418	325	253	240	305	505
29. Distance from upper border of base of horn-core to tip, straight	240	253	285	245	170	166	190	425
30. Distance between tips of horn-cores	732	800	795	800	690	600	570	900
31. Length of the premaxillae	185	186	......	......	......	145	150	192
32. Projection of the muzzle beyond the line joining the front premolars	137	142	......	......	......	116	137	153
33. Distance between bases of horn-cores added to length of upper curves of horn-cores	853	915	1,002	859	672	680	770	1,170

The writer makes use furthermore of various indices based on the measurements just mentioned. These are intended to show the ratio between measurements of important parts in each skull and to bring out the variations found in the different individuals. They are to be employed also in determining the resemblances and the differences between the various species. The record of these indices forms Table 2. The numerals found in the second column on the left side of the page refer to measurements correspondingly numbered in Table 1. The basal length (measurement 2 of the latter table) is valued at 100.

TABLE 2.—*Indices.*

	Bison occidentalis.		*Bison bison.*	*Bison alleni.*	*Bison bonasus.*
	10541	10542	22374	7706	11514
1. Basal length in 4	67	70	66	59	67
2. Basal length in 6	41	46	41	41	43
3. Basal length in 7	74	72	72	72	71
4. Basal length in 11	56	54	56	50	50
5. Basal length in 12	36	36	41	36	36
6. Basal length in 13	36	36	35	34	38
7. Basal length in 14	70	70	67	55	64
8. Basal length in 15	59	60	53	51	55
9. Basal length in 17	67	70	66	59	67
10. Basal length in 19	41	41	42	38	40
11. Basal length in 27	56	55	41	77	48
12. Basal length in 31	39	37	31	34	31
13. Basal length in 32	29	28	25	27	28
14. Basal length in 33	181	181	146	210	159

In this table the first three indices pertain to measurements which lie in the median sagittal plane. These seem to show that no important differences in longitudinal proportions exist among the species *B. occidentalis*, *B. bison*, *B. bonasus*, and *B. alleni*. *Bison alleni*, however, seems to have a somewhat shorter brain-case; but additional specimens are needed to prove this.

The indices found in lines 4 to 10 are concerned with transverse measurements and show, therefore, the relative widths of the skulls. It will be observed that there is no wide variation in the two skulls of *B. occidentalis;* nor is *B. bison* far away. In line 8 the index is 53, but another individual at hand brings it up to 59. *Bison bison* seems again to differ from both *B. occidentalis* and *B. bonasus* in the greater width of the constriction on the maxillary ridge in front of the orbit. This view is strengthened by another individual at hand.

It is to be noted that the indices of the widths in *B. alleni* are always lower than the corresponding ones in *B. occidentalis* and *B. bison*. An examination of the author's figure of this species[a] will show that this is a long-faced, narrow-headed species. *B. occidentalis* is a broad-headed form, surpassing *B. bison* in this respect.

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[a] Proc. U. S. Nat. Mus., vol. 46, pl. 16, fig. 1.

Indices for the horn-cores (pls. 1, 2) are obtained by dividing the length along the lower curve by the distance from the base of the horn-core on the upper side to the tip in a straight line. The following table presents the indices as obtained:

B. occidentalis.				*B. bison.*		*B. alleni.*	*B. bonasus.*
10541	10542	10545	10546	10544	22374	7706	11514
133	134	145	133	140	145	119	161

It will be seen that there is a wide range of curvature in *B. occidentalis*. There is no less in *B. bison*. Five individuals of the latter had this index varying from 128 to 145. From the curvature alone *B. bison* can not be distinguished from *B. occidentalis*. Nevertheless, their horn-cores are very different, those of the existing bison being short and stubby, those of *B. occidentalis* much longer and relatively slenderer. It will be observed, too, that the index of the curvature of *B. alleni* is low; that of *B. bonasus*, very high, at least as shown by the specimen at hand.

Formerly the writer proposed,[8] in view of the imperfection of most skulls of bisons, to make the distance from the lower lip of the foramen magnum to the rear of the nasals a unit for measurements. This unit has been applied in the case of the skulls studied for this paper, but the results have not been satisfactory.

A full face view of the skulls of *B. occidentalis* (pl. 1, fig. 1) shows that the face is more narrowed in front of the orbits than it is in *B. bison*. This may be tested by dividing the width at the rear of the orbits into the width on the maxillary ridge at the maxillomalar suture and multiplying the result by 100. The following results are obtained:

1	2	3	4	5	6	7	8
10541	10542	10545	10544	22374	22665	7706	11514
59	58	58	65	64	64	64	60

Of these skulls here measured the first three belong to *B. occidentalis*. That of the fourth column accompanies the materials from Minnesota and is in good condition, except that the muzzle is injured. The fifth, sixth, seventh, and eighth columns belong, respectively, to *B. bison*, *B. bison*, *B. alleni*, and *B. bonasus*. It will be noted that there is close agreement among the first three skulls, and again between the fifth and sixth; and at the same time a good deal of difference between the two groups. The skull of the fourth column agrees with the skulls of *B. bison* and not with those of *B. occidentalis*. On other grounds it had been concluded that this skull belongs to *B. bison*. The horn-cores are those of *B. bison*, as may be seen in the measurements of Table 1.

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[8] Proc. U. S. Nat. Mus., vol. 46, p. 163.

If measurements across the face be taken halfway between the maxillomalar sutures and the rough eminence on the ridge, and these be compared with the width at the rear of the orbits, the following indices will be obtained:

B. occidentalis.		*B. bison.*			*B. alleni.*	*B. bonasus.*
10541	10542	10544	22374	22665	7706	11514
52	52	58	60	58	60	53

Here again it is found that the faces of the two specimens of *B. occidentalis* are relatively narrower than those of the two recent bisons; also that number 10544 from Minnesota ranges itself with the recent bisons. The European bison No. 11514 is shown in this table, as in the preceding one, to have a face nearly as narrow, relatively to the width at the rear of the orbit, as has *B. occidentalis*.

The distal end of the muzzle of *B. occidentalis* (pl. 1, fig. 1) is not cut off as squarely as it is in *B. bison*. Another character which appears to distinguish *B. occidentalis* from *B. bison* is found in the premaxilla. This is much longer in the former (pl. 2, fig. 2) than in the latter. In the former its length is equal to the distance from the hinder end of the bone to the rear of the orbit or slightly in front. In *B. bison* the length of the premaxilla reaches only to the front of the orbit or a little beyond. As a result of this greater length of the premaxilla in *B. occidentalis* the free border of the maxilla in the nasal opening is only about one-half as long as it is in *B. bison*. The specimen from Minnesota having the catalogue number 10544 resembles in this respect the recent skulls of *B. bison*.

The upper teeth of the two best skulls in the Minnesota collection are nearly all badly injured (pl. 2, fig. 1). So far as preserved, they appear to present no differences when compared with those of *B. bison*.

It is very difficult or impossible to find means for distinguishing the teeth of any of our species of bison from those of the others. It is somewhat surprising, therefore, to find that the teeth of *B. bonasus* offer distinct differences. The following table of measurements is presented:

A. Measurements of upper teeth of bisons.

Teeth.	*B. bison.*		*B. bonasus.*	
	Length.	Width.	Length.	Width.
Pm^2	19	19	19	18
Pm^3	19	19	19	20.5
Pm^4	19	23	19	23
M^1	25	27	27	24
M^2	32	29	30.5	25
M^3	32	26	30	24

A fairer measurement for M^3 is on the outer face near the bone. In each species this is 33 mm.

It will be noted that the measurements of the premolars differ little in the two species. In the case of the molars those of *B. bonasus* are distinctly narrower than those of *B. bison.* Important differences are found on the outer face of the upper molars. In Pm^4 of *B. bison* the three outer styles are narrower than the corresponding ones of *B. bonasus*, and the middle one does not extend out to a ruler laid against the face of the tooth. In M^1 of *B. bison* the median style lies mesiad of a line laid against the outer face of the tooth, and it disappears much before the base of the tooth is reached. In *B. bonasus* this style projects out beyond a line extending from the front to the rear style, and it continues quite to the base of the tooth. In M^2 of *B. bison* all of the styles come out close to a line laid against the tooth at the middle of the height; in *B. bonasus* the median style stands out much beyond a line from the front to the rear style. In M^3 of *B. bison* the styles all extend out approximately to the same line; in *B. bonasus* the median style extends out far beyond a line joining the front and rear styles. It was formerly supposed that *Bison bonasus* and *B. bison* were closely related or were even of the same species, but it appears that the American members of the genus were more closely connected with one another than any of them are with *B. bonasus.*

In his description of the skeleton of *Bison occidentalis*, now in the University of Kansas,[4] the writer gave the dimensions of various bones of the limbs, and compared them with those of the existing bison. The same bones from the Minnesota collection, taken from those chosen for a mount, have been measured in the same way. In most cases these are slightly smaller than the corresponding ones of the Kansas specimens; but yet somewhat larger than those of the existing bison. However, a radius is 360 mm. long and 65 mm. wide at the middle. In the Kansas specimen these dimensions are respectively 345 mm. and 48 mm. It must be remembered that any one of these bones may belong to the existing bison. It is, however, probable that all belong to *B. occidentalis*.

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[4] Proc. U. S. Nat. Mus., vol. 46, p. 173.

EXPLANATION OF PLATES.

Skull of *Bison occidentalis* Lucas.

PLATE 1.

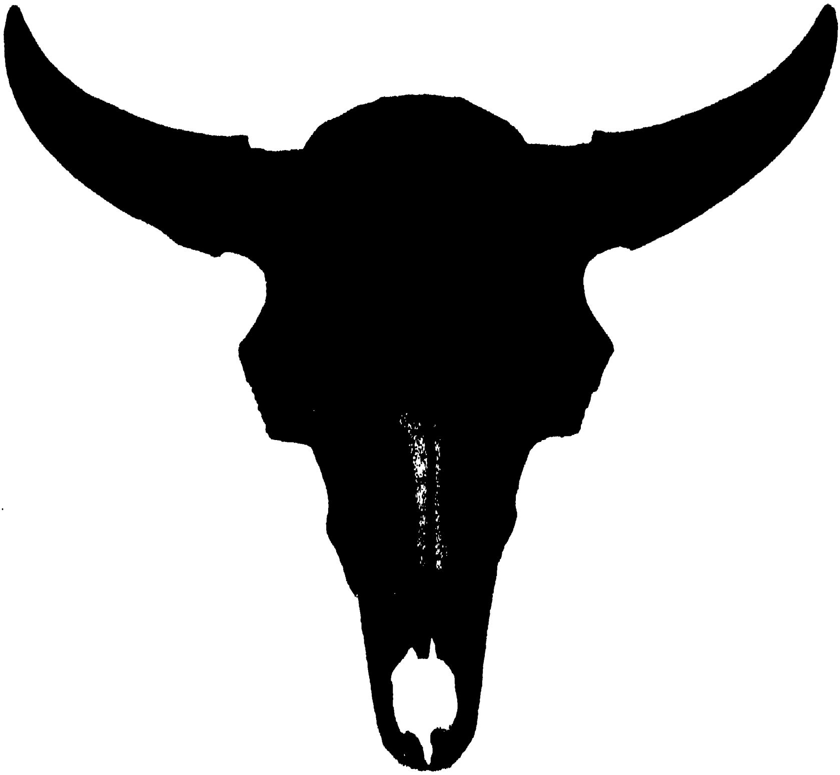
Figs. 1, 2.

1. View from in front. × .14.
2. View from behind. × .14.

PLATE 2.

Figs. 1, 2.

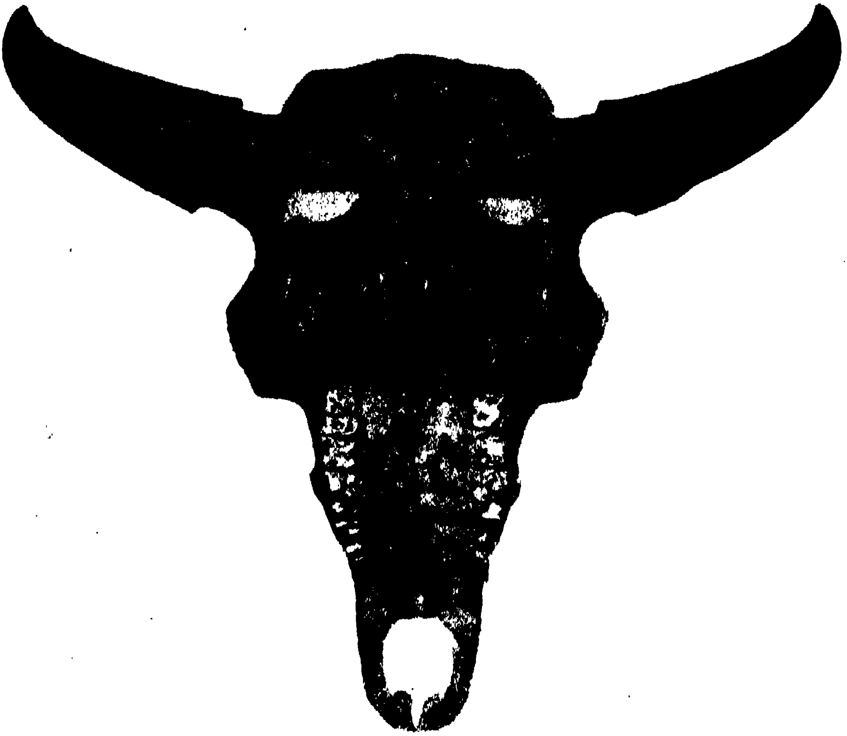
1. View of under surface. × .135.
2. View from left side. × .17.



1

2

SKULL OF BISON OCCIDENTALIS.



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Skull of Bison occidentalis.

For explanation of plate see page 8.

TWO ASIATIC MUSCOID FLIES PARASITIC UPON THE SO-CALLED JAPANESE BEETLE.

By J. M. Aldrich,
Associate Curator, Division of Insects, United States National Museum.

The two species of parasitic flies described below were both reared by J. L. King, of the United States Bureau of Entomology, Department of Agriculture, in the course of investigations in Japan upon the so-called Japanese beetle (*Popillia japonica* Newman), which has been introduced into the United States and has become a serious pest near Philadelphia, Pennsylvania.

OCHROMEIGENIA ORMIOIDES Townsend.

Ochromeigenia ormioides Townsend, Proc. U. S. Nat. Mus., vol. 56, p. 578, 1919.

This species now proves to be widespread and probably of considerable economic importance in the oriental region and northward to Japan. It is therefore deemed advisable to give a fuller description of the generic and specific characters than was contained in the reference cited above.

Genus OCHROMEIGENIA Townsend.

Front in profile long and straight. The antennae attached at the level of the middle of the eye, face moderately receding, a little protuberant at the vibrissae; the bucca slightly over a fourth of the eye-height, but ascending in its anterior portion so that the front edge of the mouth is considerably above the lower edge of the head; back of head moderately bulging below; antennae reaching about three-fourths of the way to the vibrissae, the third joint twice as long as the second; the arista with slight pubescence extending to the tip; facial ridges low, not convergent below, without hairs except close to the vibrissae. Front narrow in the male, somewhat wider in the female. Ocellar and vertical bristles very small in the male; frontals small except above, about 8 in number, extending to the base of the second antennal joint. In both females the bristles of the top of the head are rubbed off, but apparently there are no orbitals. Para frontals with small hairs below on the widened portion, continuing along the parafacial almost to the lower edge of the eyes, but not very conspicuous; palpi rather large, proboscis small.

Thorax without any striking peculiarities, chaetotaxy as follows: Acrostichals, 1 anterior; 2 (small) posterior far back; dorsocentrals, 3 anterior, 3 posterior (one of the anterior is quite far down on the neck); humeral, 2; presutural 1 large; interhumeral 1; notopleural 2; intraalar 2; supraalar 1; postalar 2; sternopleural 2 anterior, 1 posterior; pteropleural 2 or 3 minute; mesopleural 5 in posterior row. Scutellum with two lateral, no apical. Below the scutellum the usual transverse ridge of the Tachinidae.

Abdomen normal, no piercer, no discals. Legs normal, fore tarsi of female not flattened. Wing with fourth vein rounded at bend, ending almost in the apex; first vein bare, third bristly more than halfway to the small crossvein, also with several bristles below at base; apical cell narrowly open; costal spine present but small; third costal segment about half as long as fifth.

The genus is allied to *Emphanopteryx* Townsend, but has narrower parafacials, no discal macrochaetae, and first posterior cell ending more nearly in the apex.

Type of genus.—The following species. No other is known.

OCHROMEIGENIA ORMIOIDES Townsend.

Male.—Wholly yellow. The wing-veins yellow except the crossveins and tip of the auxiliary vein, which are blackish; front at the narrowest point hardly wider than the ocellar triangle; frontal stripe reddish yellow; arista yellow, thickened on the basal fifth; palpi rather stout, with black hairs. Thorax slightly opaque above with yellowish pollen. First abdominal segment without marginals, second with a stout erect pair, third with a row of ten, fourth with a similar row. The abdomen has very thin yellow pollen, and there are slight traces of a dark band along the posterior edge of the second, third, and fourth segments. Legs entirely yellow, the tarsi appearing a little darker from being covered with dense black hairs; middle tibia with one bristle on the outer front side at two-thirds its length, a small one on the inner front side at the same level and three on the outer hind side; hind tibia with two each on the inner hind, outer hind, and outer front sides. Wings not very hyaline, rather uniformly brownish.

Female.—Front twice as wide as the ocellar triangle; palpi longer than in the male and distinctly swollen toward the apex. Abdomen curved downward, the second, third, and fourth tergites being much narrower below than above. This brings the genital opening rather far forward underneath and not at the apex. Otherwise as in the male.

Length of male, 6.2 mm., of the female 5.4 mm.

Described from one male from Mount Salak, Java, collected May 15, 1909, by the Bryant-Palmer Expedition. Mr. King reared several specimens in Koiwai, Japan, from *Popillia japonica*, of which 2 males and a female are in the United States National Museum. A female specimen has also been received from Rev. D. C. Graham, collected by him at Shin Kai Si, Mount Omei, Szechuen, Western China.

Type.—Male, Cat. No. 22209, U.S.N.M.

Mr. King states that this species deposits maggots.

CENTETER,[1] new genus.

Head in profile shorter than high the front prominent, almost horizontal to the antennae in the male, in the female curving but little downward to the antennae, which are therefore very high up. Below antennae the profile curves gently backward and is very long, the oral (ventral) portion of the head being short; back of head not bulging, almost straight. Eyes bare, small, the bucca (below) equal to half the eye-height. Parafrontals and parafacials wide. Antennae long, the third joint five times the second, arista with short basal joints. Facial depression long, narrow and deep, the long and prominent ridges provided with strong bristles almost to the arista, vibrissae a little above mouth, two bristles below them. The facial depression is less than twice as wide as one parafacial, and has a low median keel for its whole length; ridges not convergent toward oral margin. Proboscis short and fleshy, palpi normal. Ocellar bristles well developed, diverging forward; frontals about 8, the upper not enlarged and reclinate, the lowest at the middle of the second antennal joint. Parafrontal with small uniformly scattered hairs, which continue on the parafacial in a narrowing space next the ridge, as far as the last third of the third antennal joint. Bucca bare except on lower edge.

Thorax of ordinary structure, with the following chaetotaxy: Acrostichals, 3 anterior, 3 posterior; dorsocentrals, 2 anterior, 3 posterior; humeral 3; presutural 1 large; interhumeral 1; notopleural 2; intraalar 3; supraalar 3; postalar 2; sternopleural 2 anterior, 1 posterior; pteropleural 1 small; mesopleural 5 in posterior row. Scutellum with 4 lateral, 1 discal, and 1 minute apical (in female).

Abdomen normal, no piercer, no discals, first to third segments with marginals, weak in females. Legs normal, fore tarsi of female not flattened. Wing with fourth vein rounded at bend, thence slightly concave, ending only a little before apex. First vein bare, third with two or three hairs; apical cell narrowly open. No costal spine; third costal segment about four-fifths as long as fifth.

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[1] Greek *κεντετερ* one who spurs or goads.

The genus is related to *Admontia*, of which the type species *amica* Meigen differs in having the penultimate joint of the arista elongated, abdomen with stout discals, and in the female with flattened fore tarsi.

Type of genus.—*Centeter cinerea*, new species.

CENTETER CINEREA, new species.

Male and female.—Head wholly gray, not silvery. Whole insect black in ground color except the palpi, which are yellow, and the basal joints of the antennae, which are slightly reddish. Thorax gray, with only indistinct indications of dorsal stripes; calypters white. Abdomen subshining black, the basal half of segments two, three, and four gray pollinose except a median line (the abdomen looks like that of *Phorocera claripennis* Macquart). Legs black; middle tibia with one bristle on outer front, one on inner front, two on outer hind side; hind tibiae with two on inner hind, an irregular row with one large at middle on outer hind, two small on outer front side.

Genital segments of male small: outer forceps of unique form, large and long, curved forward, the tips greatly widened, thin, shining brown: inner forceps about two-thirds as long, slender, separate.

Length, 6 mm.

Described from three males and six females, reared from *Popillia japonica* Newman, the "Japanese beetle." Two females from J. L. King were reared at Marioka, Japan, the others emerged from Japanese material after it arrived at the entomological laboratory at Riverton, New Jersey.

Type.—Male, and allotype, female, with seven paratypes, Cat. No. 25230, U.S.N.M. One paratype is sent to Professor Kuwana, Tokio, Japan.

Mr. King sends with the flies two adult beetles bearing eggs of the fly; these are of the macrotype kind, but not so much flattened as usual. Two were on the prothorax of the beetle, but had not hatched; the other beetle bore one on the prothorax, which also was unhatched.

This species promises to be of great economic importance. It is so common in Japan that Mr. King was able to send 700 puparia to the entomological laboratory at Riverton, New Jersey, and there seems a good prospect that it will become established.

A FOSSIL CICHLID FISH FROM THE REPUBLIC OF HAITI.

By T. D. A. Cockerell,

Of the University of Colorado, Boulder.

I am indebted to Dr. Wendell P. Woodring for permission to study a very interesting fossil fish of Miocene age, which he collected in the Republic of Haiti during a geological reconnaissance under the supervision of the United States Geological Survey. The locality is the Geological Survey fossil plant station 7544 in the arrondissement of Las Cahobas, along the road from Mirebalais to Las Cahobas, on north side of ravine at foot of mountains, on north side of gap. Prof. E. W. Berry [1] has recently published a short paper describing several fossil plants from the same beds and locality. The fish specimens consist of one fairly good example, lacking the caudal end, and fragments of others, all referable to the same species so far as the characters visible indicate. It is a fresh-water species, of the family Cichlidae, referable to the genus *Cichlasoma* Swainson, subgenus *Parapetenia* Regan. It might be placed in a different genus or subgenus on account of the ventral (pelvic) fin being before level of origin of dorsal, but it does not closely resemble *Mesonauta* Günther, which has this character. It is in fact closely allied to the series of Cuban Cichlids described by Eigenmann [2] and especially to *Cichlasoma nigricans* Eigenmann, which has the origin of ventral about level with origin of dorsal and agrees in the dorsal rays, but differs considerably in shape. The discovery is of more than ordinary interest because the Cichlids abound in South and Central America, and in tropical Africa, and it has been a matter of dispute whether they crossed the Atlantic in the northern hemisphere and were once common in Europe and North America. Fossil remains have been extremely scanty. Sauvage in 1911 described a fossil genus *Palaeochromis* from Algeria, with two species, thus indicating the former occurrence of the family in the southern part of the Palaearctic

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[1] Berry, E. W., Tertiary fossil plants, from the Republic of Haiti, Proc. U. S. Nat. Mus., vol. 62, art. 14.

[2] Bull. U. S. Fish Com., vol. 22, 1904.

No. 2475.—Proceedings U. S. National Museum, Vol. 63, Art. 7.

region. *Priscacara* of Cope, well known by beautifully preserved materials from the Green River Eocene of Wyoming, was considered by Regan to be a Centrarchid, but Haseman[1] has more recently reviewed the whole matter, and decides that it is an ancestral Cichlid. In the Antilles we have no less than six species or races of *Cichlasoma* (subgenus *Parapetenia*) living to-day in Cuba, but apparently no Cichlids whatever in the other islands. Do the Cuban fishes represent an invasion from the south in comparatively recent times, or are they the remains of a once widely distributed Antillean Cichlid fauna? The fossil would suggest the latter alternative. It may be described as follows:

CICHLASOMA WOODRINGI, new species.

D. XIV. 10 or 11. A. IV. 10. Base of ventral distinctly (about 5 mm.) before level of beginning of dorsal; body shaped practically as in *C. tetracanthus* Cuvier and Valenciennes (not nearly so deep as in *C. nigricans*); lower jaw somewhat protruding (as in *C. nigricans*); scales quadrate, a little over 2 mm. broad, with 7 to 14 basal radii, and in the apical field fine ctenoid elements arranged in decussating series. The scales are of a generalized Cichlid type similar to those of *Chaetobranchopsis ocellaris* from Brazil.

Measurements in mm.: Diameter of orbit, 7.5; orbit to end of upper jaw, 14; orbit to end of lower jaw, about 16; length of spinous dorsal, 21; of soft dorsal, about 9; length of posterior dorsal spines, about 9; length of solf dorsal rays, over 10 (ends lost); vertebrae in region of soft dorsal, 3 in about 4.4; longest (posterior) anal spines, about 10.5; soft anal rays, over 21 (from a fragment which seems to have come from a rather larger specimen); tip of lower jaw to base of anal, 46; base of ventral to base of anal, about 20; depth of body at level of ventral, 26.6; depth of body at about end of soft dorsal, 12.8.

Type.—Cat No. 10766, U.S.N.M.

EXPLANATION OF PLATE.

Both figures enlarged one and one-half times.

Cichlasoma woodringi Cockerell.

Fig. 1. Portion of fish showing scales and anal fin. Cat. No. 10767, U.S.N.M.
2. Type specimen. Cat. No. 10766, U.S.N.M.

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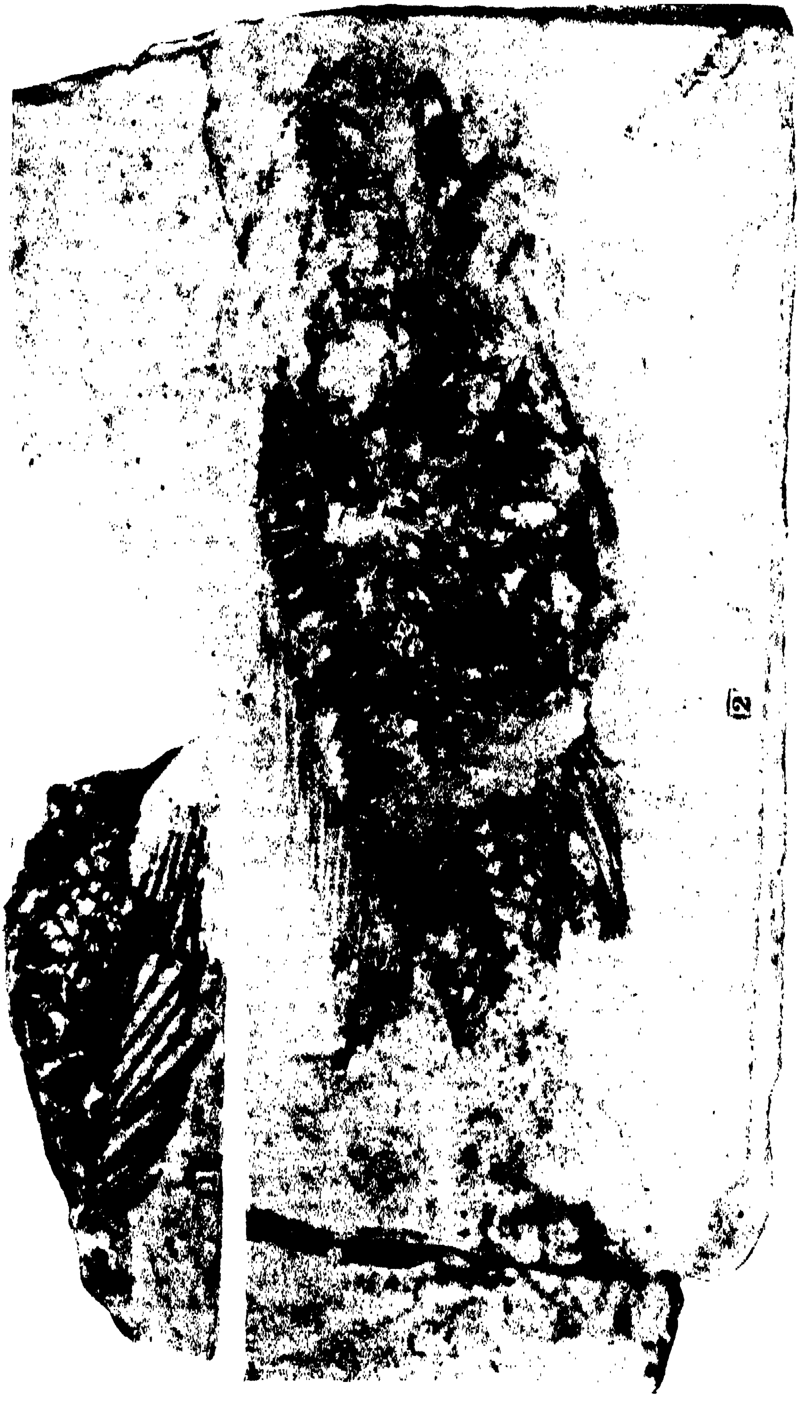
[1] Bull. Amer. Mus. Nat. Hist., vol. 31, 1912, p. 97.



A FOSSIL CICHLID FISH FROM THE REPUBLIC OF HAITI.

FOR EXPLANATION OF PLATE SEE PAGE 2.

SOME BEES FROM VICTORIA, MEXICO.

By T. D. A. Cockerell,
Of the University of Colorado, Boulder.

The bees enumerated below were all collected by T. C. Barber and T. E. Holloway at Victoria, Mexico, March 16, 1922, and sent through the Bureau of Entomology to the United States National Museum. Victoria is in the State of Tamaulipas, about 175 miles south of the Rio Grande. The bees represent an essentially tropical fauna, having little in common with that of the United States.

This small collection, made on one day in a single locality, gives these results:

(1) Three new species.

(2) Two species new to Mexico.

(3) Five species previously known from Mexico, but now first recorded from a definite locality.

(4) Three species known from definite localities in Mexico, but new to the State of Tamaulipas.

MEGACHILE TOTONACA Cresson.

One female. The abdomen is slightly metallic dorsally; the last ventral segment has some black hairs. Described from "Mexico."

MEGACHILE NIGROMIXTA Cockerell.

Two males. Described from Mexico and Guatemala, but no exact locality previously known.

MEGACHILE CHRYSOPHILA Cockerell.

One female. Described from the State of Vera Cruz.

MEGACHILE POCULIFERA Cockerell.

One male; differs a little from the type in having hair of face creamy white. Originally described (1919) from a specimen labeled "Mexico."

MEGACHILE ALOPECURA, new species.

Male.—Length about 10.5 mm., with the general aspect of *M. poculifera;* eyes blackish, green at lower end; face covered with cream-colored hair, that on cheeks pure white; mandibles broad, black, with a red subapical spot, just before which is a broad tuft of white hair; lower border of mandibles expanded into a keel, above which is a shallow longitudinal depression or channel; vertex closely but irregularly punctured; antennae black, slender and simple; hair of throax white, a little brown on disk of mesothorax; mesothorax and scutellum entirely dull, very densely rugosopunctate; a line of white hair along posterior border of mesothorax; legs black, with last joint of middle and hind tarsi clear red; anterior tarsi light yellow, the basitarsus hollowed and boat-shaped, the edges of the hollow fringed with reddish hair; posteriorly the anterior tarsi have a long fringe, blackened apically, but there is no longitudinal black stripe on the inner side, such as is seen in *poculifera;* anterior coxae with stout diverging spines, and their trochanters pointed or subconical below; middle femora stout but not toothed; tegulae piceous with broadly reddened margins; wings smoky, nervures dark, basal nervure falling short of nervulus, or meeting it; abdomen with rather weak white hair bands on segments 2 and 3, that on 2 failing in middle; fourth segment with the band somewhat reddish; fifth and sixth segments covered with fox-red hair; keel of sixth segment very broadly and quite deeply emarginate (general style of *M. gemula* Cresson), the margin somewhat irregular but not dentate; no ventral spines.

Two males; Victoria, Mexico, March 16.

Easily known from *M. gemula* by the anterior tarsi, and from *M. poculifera* by the characters of the anterior and middle legs.

Type.—Cat. No. 25580, U.S.N.M.

The above species of *Megachile* may be separated thus:

Hair of pleura at least partly black -------------------- 1.
Hair of pleura all light -------------------- 2.
1. Larger; abdomen black, without light hair above ---------- **totonaca** Cresson.
Smaller; abdomen with light hair bands laterally ------ **nigromixta** Cockerell.
2. Female; a broad pale ochreous band between mesothorax and scutellum.
chrysophila Cockerell.
Male; a narrow white band between mesothorax and scutellum ---------- 3.
3. Anterior tarsi with a short fringe of black hair along anterior edge.
poculifera Cockerell.
Anterior tarsi with a longer fringe of red hair along anterior edge.
alopecura Cockerell.

COELIOXYS TOLTECA Cresson.

One female. Differs from the next species by the form of the scutellum, the black stigma, the first recurrent nervure entering second submarginal cell far from base, and the basal nervure failing to reach nervulus. Described from "Mexico."

COELIOXYS TOLTECOIDES, new species.

Male.—Length about 10.5 mm.; black, with red legs (except tarsi), tubercles and tegulae; first three ventral abdominal segments obscurely stained with red; pubescence white, slightly yellowish on thorax above; face with white hair; mandibles black (red in *C. tolteca*); antennae black, scape red in front; cheeks covered with white hair, the depressed space below also hairy; mesothorax with exceedingly large partly confluent punctures; axillary spines stout and well-developed; scutellum with large partly confluent punctures, subconically produced but not dentate at apical middle; pleura strongly punctured, thinly hairy; anterior coxae with very short red spines; tarsi black, the anterior ones reddened basally; wings somewhat dusky, especially the broad apical margins; stigma red, nervures black; first recurrent nervure almost meeting intercubitus, joining extreme base of second cubital cell; abdomen shining, the segments sparsely punctured in middle, more densely at sides, second segment with dull closely punctured areas sublaterally; first three segments with thin marginal band of white hair; segments 2 to 5 with interrupted subbasal white hair-bands, successively less narrowly interrupted caudad; caudal end with sharp lateral spines, and sharp, widely separated, inferior apical ones, but upper apical represented by a short more or less trilobed structure, giving the abdomen a broadly truncate appearance; fourth ventral segment with two short apical spines. Hair of eyes short.

One male; Victoria, Mexico, March 16.

This is so similar to *C. tolteca* that I thought at first it must be its male, but the great differences in the scutellum and wings negative such an idea. Among the United States species there is a certain affinity with *C. texana* Cresson, but it is not close.

Type.—Cat. No. 25581, U.S.N.M.

MELISSODES TRISTIS Cockerell.

One male. Described from New Mexico. Also known from Arizona and from Juarez, Mexico.

MELISSODES MASUCA Cockerell.

One male. Described from Texas; new to Mexico. The specimen differs from the type in having the posterior side of the hind femora red only at the apical end, and the nervures dark. Similar variation occurs in specimens from the extreme south of Texas.

CHALEPOGENUS APICALIS (Cresson).

One female. Described as *Tetrapedia apicalis*, from "Mexico." Friese has recorded it from Orizaba. In our specimen the second submarginal cell receives the recurrent nervure a short distance from the tip (Cresson says "at the tip") on one side; on the other side the second intercubitus is missing. The abdomen is entirely black. The species is extremely like *C. moesta* (Cresson), but the character of the front at once separates it.

AUGOCHLORA QUIRIGUENSIS SIDAEFOLIAE Cockerell.

One female. New to Mexico; described from Guatemala. The specimen differs slightly from the type, in having the area of metathorax more finely sculptured, and strongly flushed with purple. The resemblance of this species to *A. nigrocyanea* Cockerell is only superficial, as I find on examining Guatemalan specimens of the latter, that it belongs to the subgenus *Odontochlora*, the female having a large spine on the first ventral abdominal segment.

AUGOCHLORA (ODONTOCHLORA) AZTECA (Vachal).

Female.—Length about 8.5 mm.; bright blue-green; legs black, with the anterior femora green behind, and the middle ones sometimes green beneath; antennae black, the flagellum obscurely brown beneath; mandibles black; head ordinary; clypeus shining, with large punctures; supraclypeal area rough, but distinctly punctured; front and vertex very densely rugosopunctate; anterior angles of prothorax very wide; tubercles sharp and prominent; mesothorax and scutellum densely and finely punctured; area of metathorax large, entirely covered with fine radiating striae; mesopleura rugose; tegulae dark brown, with hyaline margin anteriorly; wings hyaline, apical margin broadly faintly dusky; stigma brown; nervures dark; first recurrent joining second submarginal cell a little before end; legs with white hair, pale yellowish on inner side of tarsi; hind spur microscopically serrulate; abdomen brilliant green, delicately silvery pruinose, hind margins of segments narrowly black, and apical segment entirely black; punctures of abdomen very fine and delicate; venter black, the first segment green, and having a long sharp spine.

Two females; Victoria, Mexico, March 16.

In Schrottky's table of *Odontochlora* this runs nearest to *A. phoemonoë* Schrottky, which it much resembles, differing by the clearer wings and more distinctly (though very finely) punctured abdomen. It is easily known from *A. mülleri* Cockerell by the longer area of metathorax and much more delicately punctured abdomen. From *A. bogotensis* (Vachal) it is easily known by the basal area of metathorax being covered with striae. From *A. sporas* (Vachal) by the densely punctured middle of mesothorax. Some of the punctures on the clypeus are confluent, and the apical striae of the area of metathorax spread out to become more or less transverse, so that the characters are precisely those designated for *A. azteca* (Vachal), based on a female from Mexico in the Paris Museum. Vachal's species has never been fully described, but I can only presume that our insect is identical.

AUGOCHLORA (OXYSTOGLOSSA) DIMISSA, new species.

Female.—Extremely similar to *A. metallica* (Fabricius), bright green with the hind margins of the abdominal segments narrowly black; but easily separated by the area of metathorax, which is large, fully as long as the scutellum, evenly rounded (instead of angulate) posteriorly, and covered, nearly to the margin, with very fine radiating striae, except in the middle, where it is minutely rugosopunctate. The abdomen is not so shining as in *metallica*, and the mandibles are reddened subapically. The legs are black, with the anterior femora behind, and the middle and hind coxae green. The fifth abdominal segment is green basally, not all black as in *metallica.* The scutellum is as densely (partly confluently) punctured as possible, the punctures not of two sizes. The pubescence of the legs is pale, not black as in *A. feronia* Smith. The supraclypeal area is microscopically roughened and has sparse punctures. The hind spur of hind tibia is microscopically serrulate. The punctures of the abdomen are very small, and not dense. The wings are 6 mm. long, moderately dusky. Scutellum and postscutellum with fulvous hair.

Victoria, Mexico, March 16, one female.

This is a northern representative of the South American group of *A. metallica* (Fabricius), *A. iheringi* Cockerell, *A. caerulior* Cockerell, etc.

Type.—Cat. No. 25582, U.S.N.M.

FOSSIL CRABS FROM THE REPUBLIC OF HAITI.

By Mary J. Rathbun,

Associate in Zoology, United States National Museum.

The fossil crustaceans in the collections made by the United States Geological Survey Expedition to the Republic of Haiti in 1921 are few and fragmentary. They consist exclusively of brachyuran crabs. To only one was it considered advisable to give a specific name. A Xanthid crab, either *Zanthopsis* or an allied genus, is represented by a hand and may eventually be linked up with a known species of which only a carapace has yet been found. Various fingers of *Panopeus* might belong to any one of three common West Indian species. Other fingers of the *Panopeus* shape differ in having an oblique ridge on the upper surface, a character not before noted. A single article which is thought to be the propodus (palm) of a Parthenopid is so different from the known types as to hint at a generic separation. A fragment out of the middle of a carapace of *Mithrax* is akin to *Mithrax spinosissimus*,[1] although not corresponding in detail. This genus has not before been found fossil, but its presence in the Pleistocene was to be expected, as the genus is very abundantly distributed at the present day throughout the West Indies.

LIST OF CRABS STRATIGRAPHICALLY ARRANGED.

Pleistocene series: About 3 km S. of Môle St.-Nicolas; 9844:

MITHRAX, species.

Lower Miocene series: Right bank of River Fond Bleu; station 14 of traverse; Maïssade tongue of Thomonde formation; 9717:

PORTUNUS (PORTUNUS) HAITENSIS.

Lower Miocene series: Long bluff on right bank of River Blanche below gorge; bed 47 of section (highest bed); Maïssade tongue of Thomonde formation; 9722:

PORTUNUS (PORTUNUS) HAITENSIS.

Lower Miocene series: Trail from Las Cahobas to Thomonde, about 1.5 km S. S. E. of Thomonde; top of Thomonde formation; 9778:

PORTUNUS (PORTUNUS) HAITENSIS.

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[1] See Milne Edwards, Mag. de Zool., vol. 2, 1832, cl. 7, pls. 2 and 3.

Lower Miocene series: High bluff on left bank of River l'Ayaye about 1 km above trail crossing; Thomonde formation; 9907:

PANOPEUS, species indeterminable.

? **PANOPEUS**, species.

? **PARTHENOPE**, species.

Middle Eocene series: Road from St.-Michel to Ennery, W. slope about 1 km from divide; Plaisance limestone; 9792:

? **ZANTHOPSIS**, species.

DESCRIPTIONS OF SPECIES.

PORTUNUS (PORTUNUS) HAITENSIS, new species.

Plate 1, figs. 1–3; plate 2, figs. 1–3.

Type-locality.—Republic of Haiti: Long bluff on right bank of River Blanche below gorge; bed 47 of section (highest bed); Maïssade tongue of the Thomonde formation; lower Miocene series; February 5, 1921; W. P. Woodring (9722); 5 carapaces, incomplete, and palm of a right cheliped; Cat. No. 333430, U.S.N.M.

Measurements (approximate).—Largest carapace (pl. 1, fig. 2), length 26.2, width to base of lateral spine 36.4 mm.

Diagnosis.—A large lateral spine. Orbit very large and oblique. Front well advanced. Carapace very uneven especially in small specimens. Hand short and high.

Description.—Carapace very uneven. Deep grooves separate the branchial from the gastric and cardiac regions. A linear, median, gastric ridge, diminishing toward the front; a high, longitudinal, protogastric tubercle, distant from the median line; a deep, suboval depression on anterior half of cardiac region. A well-marked oval lobule is situated at the inner angle of the branchial region. Surface of posterolateral region extensively hollowed out.

Front well advanced, medially furrowed, interantennal margin four-lobed, lobes of median pair narrower and more advanced than those of the outer pair; median sinus V-shaped, lateral sinuses wider than any lobe, U-shaped. The tooth between the antenna and the orbit is visible in one specimen only; it appears much less advanced than the interantennal teeth, is broad, anteriorly rounded and somewhat falcate, concave on the orbital side.

The anterolateral margin is short, the orbit correspondingly wider than commonly, the number of anterolateral teeth is apparently eight in addition to the strong lateral spine.

The palm (pl. 2, fig. 1), which is supposed to belong to the same species, is short and high for a *Portunus*, being 13 mm. long through its middle and 10.5 mm. high at its highest point, a little behind the fingers. There is a wide, shallow, longitudinal furrow below the middle; upper margin convex; lower margin straight to near the finger, where it gradually ascends. The two fingers are of subequal width at their base; the dactylus has a large, purplish-black, backward-pointing tooth at its base. At the distal end of the carpus, above the middle, a rounded lobe projects toward the palm.

One specimen (pl. 2, fig. 2) shows a ventral view of the sternum and abdomen of a male. The sternum has a nearly transverse ridge between the bases of the chelipeds. The abdomen is triangular from the fourth segment to the tip; terminal segment triangular, appearing a little broader than long, although the full length may not be shown; the real length of the sixth segment does not appear, as it has been encroached upon by the long, coalesced segment (third to fifth), which is moved anteriorly out of its place.

Additional lot of specimens.—Republic of Haiti; right bank of River Fond Bleu; station 14 of traverse; Maïssade tongue of the Thomonde formation; lower Miocene series; February 2, 1921; W. P. Woodring (9717); two carapaces, fragmentary; also parts of one male abdomen and sternum; Cat. No. 333429, U.S.N.M. These are considerably larger than the type lot, one specimen (*a*) measuring about 54 mm. wide to base of lateral spine, the other (*b*) much larger, over 82 mm. wide to base of spine. These are not so uneven as smaller carapaces; the same elevations and depressions are present, but are less striking. Similar growth changes occur in other Portunids. In the smaller specimen the size and general direction of the orbit are shown; its width to the outer base of the antennal tooth is 8 mm., while the width across the front (6 teeth) is 11 mm.; upper margin of orbit oblique (the outer orbital tooth being well behind the inner tooth) and little concave; no notches can be made out. A row of punctae subparallel to the anterolateral margin begins at the base of the preorbital tooth (pl. 1, fig. 1). In the larger specimen the fifth abdominal segment is separated from the sixth (pl. 2, fig. 3).

Doubtful specimen.—Republic of Haiti: Trail from Las Cahobas to Thomonde, about 1.5 km S. S. E. of Thomonde; top of Thomonde formation; lower Miocene series; January 15, 1921; W. P. Woodring (9778); one carapace with sternum and male abdomen, one fragment of cheliped and one of an ambulatory leg; Cat. No. 333431, U.S.N.M.

The surface of the carapace is obliterated and nearly all of the border; the outline of the orbit indicates the genus; the abdomen may perhaps be the same as male, No. 9717*b*; its outlines are much broken away, but it shows a suture between fifth and sixth segments.

? ZANTHOPSIS, species.

Plate 2, figs. 6 and 7.

Republic of Haiti: Road from St.-Michel to Ennery, W. slope about 1 km from divide; Plaisance limestone; Middle Eocene series; March 4, 1921; T. W. Vaughan and W. P. Woodring (9792); palm of right cheliped, with bases of fingers attached; Cat. No. 333436, U.S.N.M.

Measurements.—Greatest length of palm (from between the fingers) 26, superior or shortest length 16, greatest height, at distal end 19.6, greatest thickness 12 mm.

As shown by the measurements, this is a short, stout hand; the distal end is vertical, the proximal end very oblique; the outer surface is very convex in a vertical direction, slightly convex from end to end; the upper surface ends proximally in a thick lobe above the articulation of the wrist; there is a small hump also at the proximal end where the hand is longest. The surface is partly overlaid by a hard matrix, but the palm appears to be without ornamentation.

A cross section of the fingers near their bases (pl. 2, fig. 7) is broad-oval, a little higher than wide, the dactylus smaller than the propodal or fixed finger.

The only *Zanthopsis* known from the West Indies is *Z. bartholomaeensis* [2] from the Eocene of St. Bartholomew, which was described from the carapace only.

PANOPEUS, species indeterminable.

Republic of Haiti: High bluff on left bank of River l'Ayaye about 1 km above trail crossing; Thomonde formation; lower Miocene series; W. P. Woodring (9907); fragments of five fingers from the chelae of a *Panopeus;* Cat. No. 333434. They might be any of the three common Recent species in the West Indies. One specimen is the proximal end of a dactyl showing the large, dark brown, backward-pointing tooth of the major cheliped; two others are, respectively, a dactyl and a fixed finger of a major cheliped, from both of which the proximal portion is lacking; the remaining two are dactyls of a minor cheliped.

A similar specimen was found in the Dominican Republic in the Yaqui Valley at Cercado de Mao.[3]

? PANOPEUS, species.

Plate 1, figs. 4–6.

Republic of Haiti: High bluff on left bank of River l'Ayaye, about 1 km above trail crossing; Thomonde formation; lower Miocene series; W. P. Woodring (9907); three dactyli from minor chelipeds of a different species from the preceding, and not referable to any of the West Indian species now existing; Cat. No. 333433, U.S.N.M.

Characterized by the superior ridge, the proximal end of which begins inside the middle of the upper surface; it gradually slants over to the middle line which it reaches when about half the length of the finger; it then widens and flattens into the general surface of the finger. Outside the proximal half of the ridge there is a deep groove, broad at first but narrowing into a linear furrow. Proximal half of upper surface finely granulate; outer and inner surfaces each with three lines of elongate punctae. Largest finger 6 mm long, tip missing.

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[2] Publ. No. 291, Carnegie Inst. Washington, 1919, p. 176. [3] Idem., p. 179.

The only recent species approaching this is *Rhithropanopeus harrisii* (Gould),[4] which occurs locally on the east coast of the United States in brackish water or in estuaries. In *harrisii* the superior ridge of the dactylus of the minor chela is less askew, the neighboring groove is shorter and the granulation is very coarse.

? PARTHENOPE, species.

Plate 2, figs. 4 and 5.

Republic of Haiti: High bluff on left bank of River l'Ayaye about 1 km above trail crossing; Thomonde formation; lower Miocene series; W. P. Woodring (9907); a right palm, showing part of upper and outer (or lower) surfaces; Cat. No. 333432, U.S.N.M.

Measurements.—Length of palm, along upper-outer margin, 11 mm, greatest width of upper surface (tip of spine broken off). 4.4 mm.

The two surfaces visible are nearly at a right angle to each other, instead of an acute angle, as usual in Parthenopids; at their union there is a narrow raised rim on the upper surface: this rim is a little convex and without spines or tubercles. The inner (or upper) edge of this surface is provided with a few spines, how many is not known, but three spines occupy the distal half of the margin; they are broad at base, rather flat, smooth, and rise very gradually and slightly above the general surface; the space between the first (or distal) and second spines is twice as great as the space between the second and third. The tips of all the spines are missing. At the distal end of the same surface, and a little above or within the outer margin there is a conical spine normal to the surface; a little higher there is indication of another spine, broken off at base. Near the margins and on the lower or outer proximal quarter, the surface is smooth; elsewhere it is granulate, granules very unequal and irregularly disposed, those on the distal half very coarse, those on the proximal half very fine. Proximal margin of surface broadly rounded. The outer surface, or lower-outer surface, according as the chela is oriented, is smooth; while its upper part is at right angles to the surface above described, its lower part curves inward. As the shell is very fragile and is embedded in a matrix, it is impossible to discover further characters.

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[4] *Pilumnus harrisii* Gould, Invert. Massachusetts, 1841, p. 326.

MITHRAX, species.

Plate 2, fig. 8.

Republic of Haiti: About 3 km south of Môle St.-Nicolas; Pleistocene series; January 31, 1921; J. S. Brown (9844); part of the center of carapace; Cat. No. 333485, U.S.N.M.

Surface curved irregularly with acute or subacute tubercles of unequal size, the larger ones being toward the lateral margin. Cervical suture well marked. A shallow groove defines the areole at the inner angle of the branchial region.

The features of the left side of the carapace have been obliterated by encrustations.

EXPLANATION OF PLATES.

PLATE 1.

FIGS. 1-3. *Portunus* (*Portunus*) *haitensis*.

FIG. 1. Dorsal view of carapace of paratype (9717*a*), natural size.
2. Dorsal view of carapace of holotype (9722*a*), natural size.
3. Restoration of carapace, based on figures 1 and 2. ×2.

FIGS. 4-6. *?Panopeus*, species, three movable fingers (9907). ×3.

FIG. 4. Right dactylus, upper-outer view.
5. Left dactylus, upper view.
6. Right dactylus, outer view.

PLATE 2.

FIGS. 1-3. *Portunus* (*Portunus*) *haitensis*, natural size.

FIG. 1. Outer surface of right manus, paratype (9722*c*).
2. Ventral surface of paratype (9722*d*).
3. Ventral surface of paratype (9717*b*).

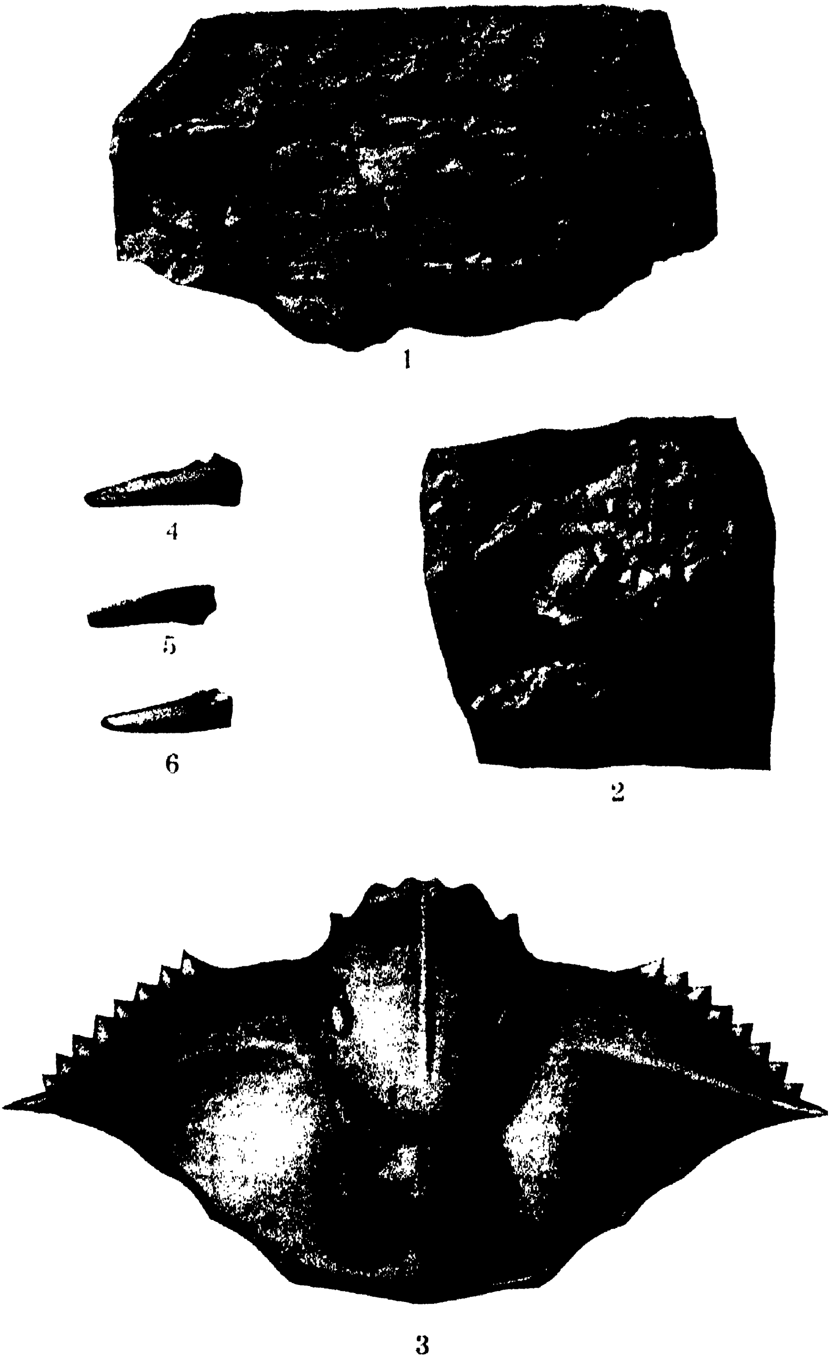
FIGS. 4 and 5. *Parthenope*, species, right palm (9907). ×3.

FIG. 4. Upper and outer surfaces, viewed obliquely.
5. Upper surface.

FIGS. 6 and 7. *Zanthopsis*, species (9792), natural size.

FIG. 6. Outer view of right palm.
7. Cross section at base of fingers.

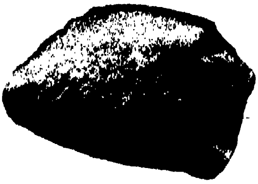
FIG. 8. *Mithrax*, species, portion of center of carapace (9844), natural size.



PORTUNUS HAITENSIS AND PANOPEUS, SPECIES.

FOR EXPLANATION OF PLATE SEE PAGE 6.

1



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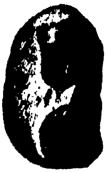

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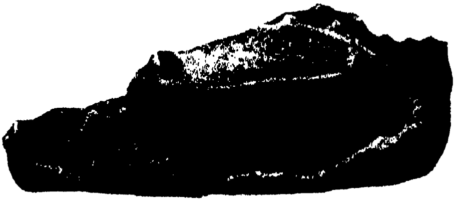

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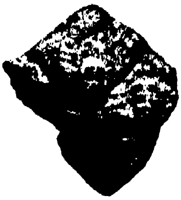

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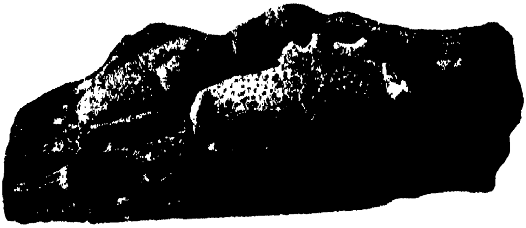

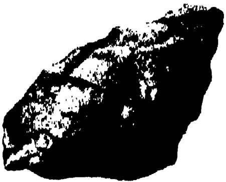

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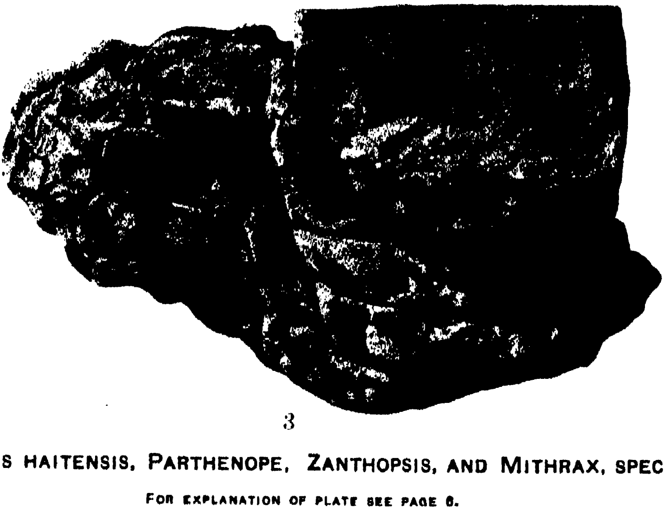

3

PORTUNUS HAITENSIS, PARTHENOPE, ZANTHOPSIS, AND MITHRAX, SPECIES.

FOR EXPLANATION OF PLATE SEE PAGE 6.

ADDITIONS AND EMENDATIONS TO UNITED STATES NATIONAL MUSEUM BULLETIN NO. 112.

By William H. Dall,

Honorary Curator of Mollusks, United States National Museum.

With the publication of United States National Museum Bulletin 112 containing a summary of the shell bearing mollusca of the Northwest coast from San Diego northward, with their geographical distribution so far as at that time determined, it was hoped that additional information would be brought out, minor errors corrected, and more light thrown on the whole subject. This has usually been the case when such lists have heretofore been published, and it was expected that the sequel to this one would prove no exception.

This expectation has not been disappointed and a sufficient number of data have accumulated to make desirable a brief supplement to the bulletin in question. Should additional material come in later, a second supplement may be added at some future time. Meanwhile I desire to express my thanks to the correspondents who have kindly furnished information herein presented, and to hope that their useful collaboration may continue indefinitely.

After the entire bulletin was in type and the proof read in November, 1920, and immediate publication expected, a delay was experienced, so that actual publication did not take place until February, 1921. Consequently all names in the bulletin dated "Dall, 1920," should read "Dall, 1921." Other changes follow:

Page 10. *Leda acuta*, add "Also Atlantic."

Page 16. *Barbatia solida*, add "San Pedro, Chace."

Section *Acar*, add: *Barbatia reeveana* Orbigny, Voy. Am. Mér., p. 635, 1846; Conch. Icon., *Arca*, pl. 14. fig. 60, 1844; Balboa, Calif., Dr. Tremper; Mazatlan, Lowe; south to Payta, Peru. *Scapharca multicostata*, add "Balboa, Calif. Dr. Tremper."

Page 17. *Atrina oldroydi*, add "San Onofre, Calif., White."

Page 18. *Ostrea lurida*, for "vol. 12" read "vol. 18."

After Pectinacea, insert "Family Pectinidae."

Page 19. *Chlamys fucicolus*, strike out reference to the *Sulphur* voyage and insert "Arnold, Tert, Pectens, Calif., p. 131, pl. 46, fig. 8, 1906."

Page 23. It now appears that *Musculus* was used by Martyn binomially in its ancient significance for *Mytilus* eleven years before Bolten, so we happily can return to the familiar generic name *Modiolaria* for the species of this group.

Page 24. *Crenella decussata*, add "also Atlantic."

Page 25. *Cyathodonta pedroana*, read "Dall, 1915."

Page 30. *Astarte globosa*, read Reeve "vol. 2."

Page 35. *Lucinoma* "*densilineata*," read "*densilirata*."

Page 41. *Pachydesma stultorum*, add "Halfmoon Bay, Weymouth."
Amiantis callosa, add "Santa Monica, Weymouth."

Page 42. *Saxidomus nuttallii*, add "Humboldt Bay, Weymouth."
Chione fluctifraga and *succincta*, add "Mugu Bay, White."

Page 49. *Donax gouldii*, add "San Luis Obispo, Weymouth."
Donax californica, add "Mugu Bay, White."

Page 50. *Sanguinolaria*, add "Mugu Bay, White."

Page 52. *Hemimactra falcata*, add "Newport, Calif."

Page 54. *Cyrtodaria kurriana*, read "1861."

Page 55. Add "*Rocellaria sp*, San Diego, Calif., Orcutt."

Page 56. Under *Xylophaga* add "*Xylophaga californica* Bartsch, 1921; Proc. Biol. Soc. Washington, vol. 34, p. 32, off Point Pinos, Cal., in 78 to 108 fathoms. Also: *Xylophaga washingtonia* Bartsch, 1921, same reference, Departure Bay, B. C., to coast of Washington. Also: under *Teredo*, "*Teredo beachi* Bartsch, 1921, Proc. Biol. Soc. Wash., vol. 34, p. 29; Bull. U. S. Nat. Mus. 122, p. 18, pl. 20, fig. 1, pl. 32, fig. 4, 1922, San Francisco Bay." Add *Teredo* (*Lyrodus*) *townsendi* Bartsch, Bull. U. S. Nat. Mus. 122, p. 26, pl. 22, fig. 2; pl. 33, fig. 2, 1922, Southern San Francisco Bay. Also: to *Teredo* (*Teredops*) *diegensis* add "Bull. U. S. Nat. Mus. 122, p. 29, pl. 22, fig. 3; pl. 34, fig. 3, 1922." The true *Teredo navalis* of Europe is not a resident of the Pacific Ocean.

Page 59. Read *Cymbuliidae*.

Page 60. *Rictaxis punctocoelata*, add "Departure Bay, B. C."

Page 61. *Acteocina culcitella*, add "San Diego, Strong."
Acteocina infrequens, fossil at Santa Monica, living Cape San Lucas to Panama.

Page 62. Above "Genus *Diaphana*" insert "Family Diaphanidae."

Page 66. *Liriola thersites*, second line, *read* "*Ann. Mag.*"

Page 71. *Antiplanes rotula*, *add* "*smithi* Arnold, not Forbes."

Page 76. *Lora woodiana*, for "strait" read "sea."

Page 86. For "*Merovia*" read "*Cypraeolina* Cerulli-Irelli, 1911."

Page 90. *Beringius kennicottii*, for "Dall, 1907," read "Dall, 1871."

Page 96. *Latisipho nalli*, read "*Latisipho halli*."

Page 108. Under *Columbella*, insert "*Columbella fuscata* Sowerby, 1832, Proc. Zool. Soc., p. 117; Thes. Conch., *Columbella*, p. 114, pl. 36, figs. 21, 25, 1847. La Jolla, Calif. (Orcutt) to Ecuador."

Page 111. Under *Thais* insert "*Thais biserialis* Blainville, 1832; Nouv. Ann. du Mus. de Paris, p. 50, pl. 11, fig. 11, La Jolla (Orcutt) to Peru."
Neptunea tenuisculpta, add "Bull. Am. Pal. VIII, No. 36, p. 5, pl. 1, fig. 6-9, 1921."

Page 113. *Pseudomurex costata* read "p. 231."

Page 114. *Opalia evicta*, vol. 44, read "vol. 64."

Page 117. For *Janthina exigua*, etc. read "*Janthina bifida* Nuttall, Jay Cat., p. 68, 1839; Conch. Icon., *Janthina*, fig. 25^{b}, Dec., 1858."

Page 121. *Chemnitzia engbergi*, add "p. 570." Under *Strioturbonilla* add, "*Strioturbonilla kincaidi* Bartsch, 1921, Proc. Biol. Soc. Wash., vol. 34, p. 33, Mar. 31, 1921; Dogfish Bay, Puget Sound."

Page 128. Under *Chrysallida* add, "*Chrysallida cumshewaënsis* Bartsch, 1921; Proc. Biol. Soc. Wash., vol. 34, p. 34; Cumshewa Inlet, B. C."

Page 136. *Amaura engbergi* and *sanjuanensis*, add "p. 570."

Page 137. *Amaura washingtonia*, add "p. 571."

Page 142. For *Triforidae* read "*Triphoridae*," and for *Trifora* read "*Triphora*" throughout. Under *Cerithiopsis* insert "*Cerithiopsis fraseri* Bartsch, 1921; Proc. Biol. Soc. Wash., vol. 34, p. 34. Clayoquot, B. C., to Victoria, B. C." Also: "*Cerithiopsis onealensis* Bartsch, 1921; same reference. p. 35; Oneal Island, Puget Sound."

Page 144. Above "Incertae sedis" insert "Section *Cerithiopsina* Bartsch, 1911," and add "*Cerithiopsis signa* Bartsch, 1921, Proc. Biol. Soc. Wash., vol. 34, p. 36; Oneal Island, Puget Sound." Also: "*Cerithiopsis willetti* Bartsch, 1921, same reference; Forrester Island (Willett) to Puget Sound."

Page 145. *Fenella* A. Adams, 1860, not Westwood 1840=*Alabina* Dall, 1902.

Page 148. For *Trichotropis costellata* substitute "*Trichotropis borealis* Sowerby, 1829, Zool. Journ, vol. 4, p. 375."

Page 149. *Caecum dalli*, *licalum*, *diegense*, *grippi*, and *Micranellum pedroense*, add "p. 568."

Page 150. For all species of *Micranellum* add "p. 569." For *Fartulum hemphilli*, *occidentale*, and *bakeri*, add "p. 566." For *Elephantulum carpenteri* add "p. 567."

Page 151. *Petaloconchus montereyensis*. Add "Catalina Island."

Page 152. *Littorina*, add "Blainville, 1828." For section *Littorina* s. s. read "*Neritoides* Brown, 1827."

Page 153. *Littorina sitchana*, read "*Littorina sitkana*," and correct "Litorina to "*Littorina*." For section *Algaroda*, read "*Littorina* s. s."

Page 156. *Alaba catalinensis*, add "p. 572." *Diala marmorea* may prove to be a *Barleeia*.

Page 158. Under *Alvania* insert "*Alvania burrardensis* Bartsch, 1921, Proc. Biol. Soc. Wash., vol. 34, p. 38, Burrard Inlet, B. C.

Page 159. *Alvania sanjuanensis*. Read "Bartsch, 1921, Proc. Biol. Soc. Wash., vol. 34, p. 37."

Page 160. *Truncatella californica*. After "San Martin Island" read "Lower California."

Page 168. Under *Crucibulum*, insert "*Crucibulum imbricatum* Sowerby. Genera, *Calyptraea* fig. 5; Broderip, Trans. Zool. Soc. London, vol. 1, p. 193, pl. 27, fig. 7, 1834. La Jolla, Cal. (Orcutt) to Peru."

Page 174. *Chlorostoma gallina umbilicatum*, add "Catalina Island."

Page 177. *Cidarina*, read "Dall, 1909." *Cidarina cidaris*, read "Proc. U. S. Nat. Mus., vol. 15, pl. 22, fig. 4." For *Solaricida* read "*Calliotropis* Seguenza, 1903." The former dates from 1919.

Page 181. Under *Vitrinella* add "*Vitrinella columbiana* Bartsch, 1921; Proc. Biol. Soc. Wash., vol. 34, p. 39. Departure Bay, British Columbia."

Page 182. *Cyclostremella concordia*, add "p. 572."

Page 188. *Schismope coronata*, Bartsch regards this as a new species which he calls *S. californica*. He also refers *S. caliana* to *Adeorbis*.

Page 192. *Ischnochiton serratus* dates from 1864.
Ischnochiton berryi, read "vol. 55."
Ischnochiton mertensii, add "San Martin Island, Lower California."

Page 193. *Pallochiton*, read "1879."

Page 194. *Callistochiton crassicostatus*. Add "San Martin Island, Lower California."

Page 196. *Placiphorella velata*. Add "Sooke Harbor, Vancouver Island, Macoun."

Page 197. *Placiphorella pacifica*, read "Kasaan Bay."
For *Katherina* read "*Katharina*."
Genus *Cryptochiton*, for Gray read "Middendorff."

Page 210. Belcher, Last of the Arctic Voyages, read "vol. 2."

CRYSTALLOGRAPHIC NOTES ON STEPHANITE IN A SILVER ORE FROM MEXICO.

By Earl V. Shannon.

Assistant Curator, Department of Geology, United States National Museum.

The following short note contains the results of a crystallographic examination of several specimens of silver ore labeled as having come from the Campania mine, Sultepec, Mexico. The specimens were received by this department from the Division of Mineral Technology and probably originally formed part of the exhibits at the Panama Pacific Exposition (San Francisco, 1915). The measurements identify the silver mineral as stephanite, although its appearance and habit are such that its identity was not suspected prior to the crystallographic examination. The number assigned the material in the museum catalogue is 90,937. The best specimens have been transferred to the mineralogical collections, while a larger one of poorer quality is preserved in the study collection of silver ores.

The stephanite forms brilliant striated and highly modified prismatic crystals, elongated in the vertical direction (*c* axis), very unlike the tabular habit usually assumed by this mineral. Although other localities have frequently furnished twins according to several laws, especially pseudohexagonal forms produced by twinning on *m* (110), no evidence of twinning was seen in the present specimens unless the arrangement of striations on a single face of one crystal contains such evidence.

The crystals, which reach 1.5 cm in length, with a diameter of 0.4 cm, lie scattered through coarsely crystalline white to colorless or slightly greenish calcite and project into small vuggy cavities in a manner suggesting that the silver mineral and its gangue were deposited simultaneously. The only other silver mineral contained in the specimens is polybasite, which occurs in a single small vug as incompletely developed crystals, which rest upon and are evidently younger than the stephanite. Included in the calcite-stephanite vein filling are numerous crushed fragments of a wall rock which has the appearance of a highly sericitic fine-grained schist or shale. These inclusions contain more or less pyrite, either as scattered crystals or a fine-grained replacement. The stephanite is dark lead-gray in color and shows a brilliant conchoidal fracture with only traces of cleavage.

The mineral gives the usual blowpipe reactions for stephanite, and the essential constituents were found by appropriate chemical tests to be silver, antimony, and sulphur, while arsenic and lead were proven absent.

No. 2479. Proceedings U. S. National Museum, Vol. 63, Art. 11.

Three crystals were measured in detail, and upon these 39 forms were found, 7 of which are new for the species. These 3 crystals are represented as nearly as practicable in their actual development in the Figures 1 to 3. The terminal faces of crystal 1 are highly lustrous, but all of the larger faces are marked by discontinuous grooves parallel to the plane *m* (1$\bar{1}$0) in the drawing. On crystal 2, the pyramidal faces are all horizontally striated by reentrant angles, while the dome (021) has two sets of striations parallel to (110) and ($\bar{1}$10) meeting down the center of the face. All of the faces in the prismatic zone are deeply striated. These striae do not, however, produce any rounding of the angles, but they consist of minute and very sharp reentrant angles. Thus, a single sharp and brilliant signal may result from simultaneous reflection from half a hundred narrow lines in exactly parallel position. In this respect the drawings are greatly generalized, only the major repetitions and reentrant angles being shown.

In the following table are given the averages of the angles measured on the three crystals:

Forms and angles on stephanite.

Letter.	Symbol.		Quality.	Faces.	Measured.				Calculated.			
	Miller.	Gdt.			φ		ρ		φ		ρ	
					°	′	°	′	°	′	°	′
c	001	0	Excellent	3	..	..	0	00	..	..	0	00
b	010	000	....do	5	0	00	90	00	0	00	90	00
λ	310	300	....do	5	78	06	90	00	78	09	90	00
New	540*	5/4 ∞	....do	1	63	44	90	00	63	17	90	00
o	110	∞	Very good	7	57	44	90	00	57	49	90	00
O	230	∞ 3/2	Poor	1	46	43	90	00	46	39	90	00
U	120	∞ 2	Medium	2	38	29	90	00	38	28	90	00
𝔊	5.11.0	∞ 11/5	....do	1	35	36	90	00	35	51	90	00
π	130	∞ 3	Fair	6	28	05	90	00	27	55	90	00
New	3.10.0*	∞ 10/3	Medium	1	25	09	90	00	25	30	90	00
New	290*	∞ 9/2	....do	1	20	12	90	00	19	27	90	00
l	150	∞ 5	Poor	2	17	30	90	00	17	38	90	00
	1.15.0	∞ 15	Fair	2	6	20	90	00	6	11	90	00
g	201	20	Good	1	90	05	65	43	90	00	65	20
β	101	10	Fair	1	90	07	47	53	90	00	47	26
𝔟	203	2/3 0	Good	1	91	37	37	49	90	00	35	59
e	041	04	....do	1	0	00	69	42	0	00	69	57
d	021	02	Excellent	2	0	00	53	43	0	00	53	52
κ	043	0 4/3	Poor	1	0	00	42	02	0	00	42	24
k	011	01	Good	3	0	11	34	20	0	00	34	25
t	023	0 2/3	Excellent; very poor	4	0	00	24	35	0	00	24	33
N·	331	3	Good	2	57	52	75	33	57	49	75	28
r·	221	2	....do	3	58	06	68	51	57	49	68	46
p·	332	3/2	Very good	1	58	22	62	29	57	49	62	36
P·	111	1	Excellent	8	57	57	52	09	57	49	52	08
h·	112	1/2	Good	8	57	56	32	31	57	49	32	45
New	225*	2/5	Excellent	1	58	22	27	05	57	49	27	14
m·	113	1/3	Excellent; poor	5	57	55	23	19	57	49	23	13
q:	114	1/4	Very good	1	57	27	17	48	57	49	17	50
New	118*	1/8	Poor	1	57	55	8	55	57	49	9	08
H·	122	1/2 1	Medium	2	38	48	41	21	38	28	41	11
u:	131	13	Poor	2	28	12	66	56	27	55	66	44
v:	132	1/2 3/2	Good	1	27	54	49	20	27	55	49	18
New	133*	1/3 1	Poor	3	28	03	37	45	27	55	37	42
ω:	134	1/4 3/4	....do	1	28	22	30	21	27	55	30	10
New	3.10.5*	3/5 2	Good	1	25	37	57	37	25	30	56	37
W:	3.11.3	1 11/3	Fair	1	22	07	69	36	23	26	69	56
T:	142	1/2 2	Good	3	22	07	55	46	21	40	55	51
	155	1/5 1	....do	2	17	36	35	46	17	28	35	42

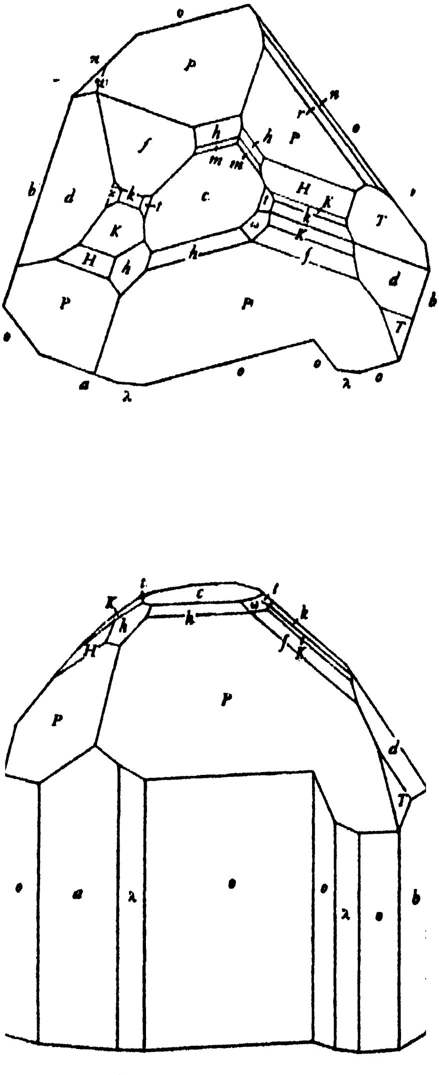

FIG. 1.—STEPHANITE CRYSTAL 1 SHOWING ACTUAL DEVELOPMENT.

The order of agreement between the measured and calculated angles is very good for the principal forms. The forms here given as new are as follows:

540 ($\frac{5}{4}\infty$). This form was found once only as a moderately broad face yielding an excellent signal on crystal 2, as shown in Figure 2. Angles:

	° ′	° ′
Measured	φ=63 44	ρ=90 00
Calculated	φ=63 17	ρ=90 00
Difference	φ= 0 27	ρ= 0 00

The agreement is satisfactory. However, in common with the other prismatic forms here listed as new, this form does not fit into the rhythmic series when its zone is analyzed according to Goldschmidt's Law of Complication. Extra or irrational forms are not rare with this mineral.

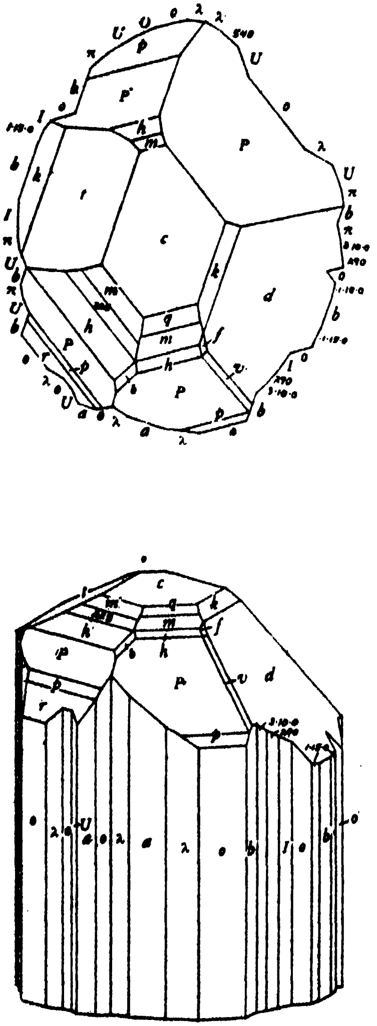

FIG. 2.—STEPHANITE CRYSTAL 2 WITH FORMS (225), (290), (3-10-0) AND (1-15-0) SHOWING ACTUAL DEVELOPMENT.

3.10.0 ($\infty \frac{10}{3}$). Observed only once as a broad line face yielding a moderately good signal on crystal 2. Angles:

	° ′	° ′
Measured	ϕ=25 09	ρ=90 00
Calculated	ϕ=25 30	ρ=90 00
Difference	ϕ= 0 21	ρ= 0 00

290 ($\infty\frac{9}{2}$). Like the preceding, seen only as a single relatively narrow face yielding a moderately good signal on crystal 2 and shown in Figure 2. Angles:

	° ′	° ′
Measured	ϕ=20 12	ρ=90 00
Calculated	ϕ=19 27	ρ=90 00
Difference	ϕ= 0 45	ρ= 0 00

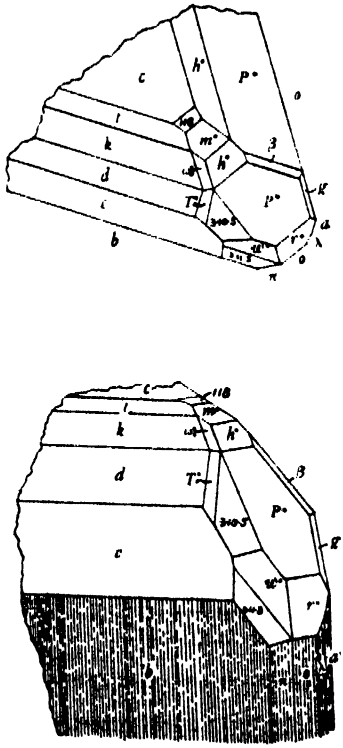

FIG. 3.—STEPHANITE CRYSTAL 3 WITH FORMS (118), (3-10-5) AND (3-11-3) SHOWING ACTUAL DEVELOPMENT.

225 ($\frac{2}{5}$). Observed as a single relatively prominent face yielding an excellent signal on crystal 2, as shown in Figure 2. Angles:

	° ′	° ′
Measured	ϕ=58 22	ρ=27 05
Calculated	ϕ=57 49	ρ=27 13
Difference	ϕ= 0 33	ρ= 0 08

118 ($\frac{1}{8}$). Observed as a single small face yielding a comparatively poor signal on crystal 3, as shown in Figure 3. Angles:

	° ′	° ′
Measured	ϕ=57 55	ρ= 8 55
Calculated	ϕ=57 49	ρ= 9 08
Difference	ϕ= 0 06	ρ= 0 13

133 (⅓1). A form not previously recorded, although there are listed in Goldschmidt's Winkeltabellen two forms, (13.39.40) and (3.9.10), which are very close to it. The new form was observed as three faces—two on crystal 1, shown in Figure 1, and one on crystal 2, shown in Figure 2. Angles:

	° ′	° ′	
Measured, crystal 1	ϕ=28 03	ρ=37 45	—poor.
Measured, crystal	ϕ=27 44	ρ=37 43	—poor.
Measured, crystal 2	ϕ=27 54	ρ=37 47	—very good.
Calculated, 133	ϕ=27 55	ρ=37 42	
Calculated, 13.39.40	ϕ=27 55	ρ=37 05	
Calculated, 3.9.10	ϕ=27 55	ρ=34 54	

The form is thus well established.

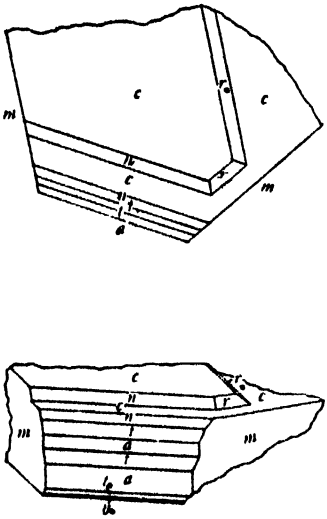

FIG. 4.—POLYBASITE CRYSTAL SHOWING ACTUAL DEVELOPMENT.

3.10.5 (⅗ 2). This form is represented by a single relatively prominent face yielding a good signal on crystal 3, as shown in Figure 3. Angles:

	° ′	° ′
Measured	ϕ=25 37	ρ=57 37
Calculated	ϕ=25 30	ρ=56 37
Difference	Φ= 0 07	ρ= 1 00

The polybasite crystals are black in color and very lustrous. The best crystal was measured and is faithfully reproduced in the drawing Figure 4. Oriented as drawn, the angles are in very close agreement with those given in the Winkeltabellen. The crystals do not exhibit any unusual features, the habit being tabular, as is characteristic of the mineral. They show the usual step structure, as indicated in the drawing, this tendency being manifested also in hexagonal or triangular markings on the basal pinacoid. The streak of the polybasite is dark red, and, in the absence of distinct crystals, it might be mistaken for pyrargyrite.

CATALOGUE OF HUMAN CRANIA IN THE UNITED STATES NATIONAL MUSEUM COLLECTIONS.

By Aleš Hrdlička,
Curator, Division of Physical Anthropology.

The collections of the Division of Physical Anthropology in the United States National Museum, begun, through the instrumentality largely of Dr. W. H. Holmes, 22 years ago by the return or transfer of 2,300 crania from the Army Medical Museum, have now reached such proportions that their complete scientific description will take not merely years but generations. They embrace upward of 10,000 crania and skeletons, besides large quantities of various individual bones, and new accessions are still being received. The material is well identified as to people and locality, all specimens with imperfect information in these respects having been weeded out. The bulk of it is American, both north and south; but there are also fine series from Hawaii, Egypt, and other regions.

It is plain that in the interests of science the principal data on this important material should be placed in the hands of scientific workers as soon as possible. If this can not be in full elaboration, it should be done in some simpler form. What anthropology needs most are ample, dependable data, which may with full confidence be used in investigation.

The simplest, most practicable, least costly way of achieving this is doubtless by means of a catalogue of the essential measurements of the specimens. Catalogues of a similar nature have been published in England (Davis, Flower); in Germany (Collections of the German Museum); in France their place is taken by the monumental Crania Ethnica (Quatrefages and Hamy); in Sweden by the Crania Suecica Antiqua (Gustaf Retzius); and in Bohemia by the Crania Bohemica (Matiegka).

In America we have the less comprehensive Crania Americana of Morton, the Crania Mexicana of the Mission Scientifique en Mexique, the Crania Americana of Rudolf Virchow, and the Otis Catalogue; but all of these suffer from small numbers or other serious imperfections. The Otis Catalogue especially can not be used,[1] but the crania

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[1] See Hrdlička (A.), Physical Anthropology; Its Scope and Aims; Its History and Present Status in the United States. Octavo, Philadelphia (Wistar Institute), 1919.

No. 2480—Proceedings U. S. National Museum, Vol. 63, Art. 12.

used in its production now form part of the National Museum collections and may be remeasured.

The desirability of publishing a catalogue of the crania in the National Museum has long been felt by the writer, especially during the last few years, when time and again serious errors have been encountered in the writings of foreign authors dealing with American anthropology, obviously due to the fact that these authors lacked sufficient records on American skeletal material. In the course of years, also, there have accumulated many series of measurements for which individually there was and is little chance of publication.

Certain practical difficulties in the way of the undertaking delayed its execution. In the first place it was necessary to consider the cost of the work and the chances of its publication; in the second, a decision had to be made as to the most serviceable form.

In consultation on this subject with Dr. L. Stejneger, head of the publication committee of the Smithsonian Institution, at the beginning of the current year, it was thought best that the measurements, reduced to what would be of the greatest need and help to others, should be published—not as a large and costly volume, the preparation of which would be a work of long duration, but rather in a serial form, printing the separate parts as soon as ready and covering one ethnic group of this continent after another and then the remainder of the collections. It was self-evident that if the catalogue was to be of real utility the measurements should be published in detailed form, for in such a form they best show the individual variation; they can be used in different ways by different students according to their needs; and they may be added to in the future when further collections from the same tribes or regions may become available.

It was some months after this that a strong letter, urging publication of the essential data on our collections, was received by the Secretary of the Smithsonian Institution from Prof. Roland B. Dixon, of Harvard, who, engaged on a book dealing with American anthropology, found great difficulty in obtaining sufficient data on American cranial material. The final result of this and the writer's recommendations was that the preparation and printing of the catalogue in serial form was authorized by the Institution.

The catalogue will be published as parts of the Proceedings of the United States National Museum. Each part will be published and distributed as a separate, and it is expected at least one of these separates will appear each year.

The arrangement of the catalogue will in the main be geographical, beginning with the northernmost parts of North America and proceeding southward, but due attention will be paid to already established groupings. The sex and other important determinations have been made by the writer. The measurements are largely his, partly made under his direction and supervision by Mr. Paul Van Natta, aid in the division. The measurements were and will be made with well-tested instruments of best standards, with due care, and according to the methods of the international agreements with those described in the writer's Anthropometry.[1]

Only the simplest and most helpful calculations will be admitted. Descriptive notes must be reserved for special studies. Annotation will be restricted to a brief enumeration of the plainest deductions.

It was contemplated at first that the catalogue should contain only measurements of the crania; but the need of furnishing to anthropology reliable data also on the rest of the skeletal material is such that it was decided to include those parts also. The data on the crania, however, will take precedence. For the sake of greater serviceability measurements will, in some instances, be added that were taken by the author on his own and other collections in other institutions, especially the American Museum of Natural History.

Only one word remains to be said and that is that any further utilization of the National Museum collections comprised in the catalogue by well-qualified students is invited and will in every possible way be facilitated.

ALEŠ HRDLIČKA.

JUNE 1, 1923.

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[1] Octavo, Wistar Institute, Philadelphia, 1921.

ESKIMO.

Greenland Eskimo crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
242,707			Adult		19.4	12.5	14.6
227,806		Nourssoak Peninsula.	do		19.9	13.3	14.4
225,035			do		19.2	12.9	13.9
242,721			do		19.2	12.9	13.8
242,829			do		19.4	13.1	14.2
242,832			do		19.4	13.2	13.9
242,734			do		19.4	13.3	14.4
242,702			do		19.1	13.2	14.3
242,760			do		19.3	13.4	13.5
228,268			do		19.6	13.6	13.6
242,726			do		19.2	13.4	14.1
242,761			do		19.8	13.9	14.4
177,902			do		19.6	13.8	13.8
242,720			do		19.0	13.4	13.9
242,747			do		19.0	13.4	12.9
242,710			do		19.0	13.5	13.5
228,264			do		20.1	14.3	14.0
242,833			do		18.9	13.5	14.0
242,715			do		18.6	13.3	13.4
242,695			do		18.4	13.2	14.3
242,730			do	Very slight asymmetry.	18.8	13.5	14.4
242,733			do		18.9	13.6	14.4
242,744			do		18.9	13.7	13.7
242,713			do		18.8	13.8	14.4
228,271			do		18.7	13.8	13.6
242,687			do		19.1	14.2	14.5
214,150			do		18.4	13.7	13.3
242,749					18.7	14.0	14.1
242,688					18.8	14.1	14.2
226,170					18.5	13.9	13.4
242,729					18.8	14.2	13.2
225,148					19.3	14.6	14.5
228,263					18.2	13.8	14.2
242,709					18.7	14.2	13.8
242,697					18.4	14.1	14.0
242,835					19.5		13.6
242,716					19.0		14.0
242,706					19.0		14.0
242,698						13.2	14.1
177,986							
Total					(38) 724	(36) 489.5	(39) 544.3
Average					*19.05*	*13.59*	*13.95*

ESKIMO.

Greenland Eskimo crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
63.9	91.5	15.50	1,470	......	7.8	13.1	......	59.5	3.75	4.0	93.8	5.5	2.2	40
66.8	86.7	15.87	1,620	13.6	7.9	14.6	93.2	54.1	3.5	4.0	87.5	5.6	2.2	39.3
67.2	86.6	15.33	1,440	......	7.6	12.9	......	58.9	3.7	4.0	92.5	5.2	2.4	46.2
67.2	86	15.30	1,500	......	6.8	......	......	......	3.9	3.9	100	5.1	2.0	39.2
67.5	87.4	15.57	1,510	......	7.3	13.5	......	54.1	3.4	3.9	87.2	4.9	2.2	44.9
68.0	85.3	15.50	1,610	......	8.5	14.1	......	60.3	3.8	4.0	95	6.0	2.5	41.7
68.6	88.1	15.70	1,650	......	7.5	......	......	......	3.7	3.95	93.7	5.5	2.1	38.2
69.1	88.5	15.53	1,610	......	7.7	13.5	......	57.0	3.75	3.9	96.2	5.8	2.2	37.9
69.4	82.6	15.30	1,530	......	7.5	13.6	......	55.1	3.8	4.0	95	5.4	2.2	40.7
69.4	81.9	15.60	1,610	12.0	7.3	14.8	81.1	49.3	3.55	4.1	86.6	5.2	2.5	48.1
69.8	86.5	15.57	1,660	......	7.4	13.6	......	54.4	3.8	4.05	93.8	5.3	2.6	49.1
70.2	85.5	16.03	1,730	......	8.0	14.9	......	53.7	3.6	4.05	88.9	5.7	2.4	42.1
70.4	82.6	15.73	1,660	......	7.3	14.3	......	51.0	4.0	4.2	95.2	5.7	2.6	45.6
70.5	85.8	15.43	1,570	......	......	13.0	......	......	3.9	4.0	97.5	5.2	......	......
70.5	79.6	15.10	1,470	......	7.5	13.1	......	57.2	3.6	3.9	92.3	5.2	2.0	38.5
71.0	83.1	15.33	1,570	......	7.1	14.0	......	50.7	3.55	3.95	89.9	5.1	2.4	47.1
71.1	81.4	16.13	1,685	......	7.4	14.5	......	51.0	3.35	4.0	83.8	5.4	2.3	42.6
71.4	86.4	15.47	1,605	......	8.1	14.0	......	57.9	4.0	4.07	98.3	5.2	2.15	41.3
71.5	84.0	15.10	1,430	......	7.4	13.8	......	53.6	3.62	3.95	91.6	5.1	2.1	41.2
71.7	90.5	15.63	1,470	......	6.8	13.7	......	49.6	3.8	4.0	95	5.0	2.1	42
71.8	89.2	15.57	1,540	......	7.6	14.1	......	53.9	3.85	4.05	95.1	5.6	2.3	41.1
72	88.6	15.63	1,510	......	7.5	14.7	......	51.0	3.6	3.95	91.2	5.3	2.3	43.4
72.5	84.0	15.43	1,630	......	7.7	14.2	......	54.2	3.3	40.5	81.5	5.1	2.4	47.1
73.4	88.3	15.67	1,550	......	......	......	......	......	......	......	......	......	......	......
73.8	83.7	15.37	1,490	......	7.7	14.5	......	53.1	3.6	4.2	85.7	5.4	2.5	46.3
74.4	87.1	15.93	......	......	7.2	......	......	......	3.8	4.1	92.7	5.5	2.5	45.4
74.5	82.9	15.13	1,490	......	......	13.6	......	......	......	......	......	5.0	......	......
74.9	86.2	15.60	1,560	......	7.2	14.6	......	49.3	3.9	4.1	95.1	5.1	2.2	43.1
75	86.3	15.70	1,725	......	7.3	13.8	......	52.9	3.7	4.0	92.5	5.2	2.3	44.2
75.1	82.7	15.27	1,430	......	7.3	14.0	......	52.1	3.4	4.1	82.9	5.3	2.2	41.5
75.5	80	15.60	1,490	......	......	......	......	......	3.75	4.05	92.6	5.8	2.2	37.9
75.6	85.5	16.13	1,635	......	8.1	14.6	......	55.5	3.95	4.05	97.5	5.9	2.1	35.6
75.8	88.6	15.40	1,475	......	6.7	......	......	......	3.4	4.1	82.9	5.2	2.3	44.2
75.9	83.9	15.57	1,500	11.1	6.9	14.5	76.6	47.6	3.5	4.0	87.5	5.0	2.6	52
76.6	86.2	15.50	1,610	12.0	7.2	15.0	80	48	3.9	4.2	92.9	5.3	2.2	41.5
......	......	......	......	......	7.2	......	......	......	3.5	3.8	92.1	5.3	2.4	45.3
......	......	......	......	......	7.8	......	......	......	3.55	3.95	89.9	5.3	......	......
......	......	......	......	......	7.2	......	......	......	3.6	4.1	87.8	5.4	2.6	48.2
......	......	......	......	......	7.7	13.6	......	56.6	3.8	3.85	98.7	5.5	2.2	40
......	......	......	......	......	6.8	......	......	......	3.8	3.85	98.7	4.9	2.3	46.9
(35)	(35)	(35)	(34)	(4)	(36)	(30)	(4)	(28)	(38)	(38)	(38)	(39)	(36)	(36)
......	......	......	53,035	48.7	268	420.2	......	......	139.97	152.42	......	208.2	82.75	......
71.5	85.5	15.54	1,560	12.18	7.4	14	82.7	53.6	3.68	4.01	91.8	5.33	2.29	42.9

Greenland Eskimo crania—Continued.

FEMALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
242,711			Adult		19.0	12.8	12.9
225,036			do		17.7	12.2	13.2
242,691			do		17.9	12.4	12.9
242,714			do		18.4	12.8	12.8
242,700			do		18.4	12.8	14.0
242,693					18.1	12.6	13.2
242,717					17.8	12.4	12.5
225,034					18.2	12.7	13.4
242,735					18.2	12.7	12.9
177,993					18.6	13.0	13.0
228,272					18.3	12.8	13.1
242,740					18.3	12.9	13.0
242,736					19.2	13.6	13.4
242,757					18.2	12.9	13.4
242,704					17.9	12.7	12.9
228,266					18.0	12.8	13.1
242,725					18.0	12.8	12.9
242,739					17.7	12.6	13.4
242,759					18.4	13.1	13.0
225,147					17.0	12.1	13.2
242,737					17.8	12.7	12.6
242,694					18.0	12.9	13.7
242,745					17.9	12.9	13.3
242,724					18.0	13.0	13.1
242,743					18.8	13.6	13.6
242,689					17.8	12.9	12.4
242,746					17.6	12.9	12.5
242,708					18.0	13.2	13.1
177,996					18.4	13.5	14.0
225,037					18.2	13.4	12.6
228,270					17.6	13.0	13.0
242,738					17.5	13.0	13.2
228,265					18.2	13.8	13.4
242,748					17.6	13.4	14.0
242,712					17.2	13.2	13.0
242,718					17.8	13.7	12.8
213,620					17.8	14.0	13.8
177,985					17.9		13.0
177,988					17.8		13.6
177,990					17.9		13.4
177,991					17.8		13.4
177,994					17.1		13.0
242,699					18.0		12.9
242,741					17.9		12.9
					(44)	(37)	(44)
Total					791.9	479.8	578.4
Average					*17.99*	*12.96*	*13.1*

Greenland Eskimo crania—Continued.

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
67.4	81.1	14.90	1,470	......	7.0	13.0	......	53.8	3.9	4.0	97.5	5.3	2.3	43.4
68.9	88.6	14.37	1,285	......	......	12.6	......	......	3.25	3.6	90.3	5.2	2.4	46.2
69.3	85.1	14.40	1,180	......	......	13.1	......	......	3.6	3.95	91.2	5.0	2.7	54
69.6	82.0	14.67	1,400	......	7.1	13.0	......	54.6	3.6	3.95	91.2	5.0	2.1	42
69.6	89.7	15.07	1,400	......	......	13.4	......	......	3.7	4.2	88.1	......	1.9	......
69.6	86	14.63	1,330	......	6.9	12.1	......	57.0	3.5	3.65	95.9	4.9	2.3	46.9
69.7	82.8	14.23	1,240	......	6.5	12.2	......	53.3	3.75	4.1	91.5	4.7	2.2	46.8
69.8	80.7	14.77	1,240	......	6.4	12.7	......	50.4	3.15	4.0	78.8	4.7	2.2	46.8
69.8	83.5	14.60	1,220	......	......	......	......	......	3.3	3.55	93	5.1	2.2	43.1
69.9	82.3	14.87	1,300	......	......	......	......	......	......	......	......	......	......	......
70	84.2	14.73	1,310	......	6.4	......	......	......	3.55	3.9	91	4.6	2.2	47.8
70.5	83.3	14.73	1,330	......	......	12.9	......	......	3.8	4.0	95	5.1	2.4	47.1
70.8	81.7	15.40	1,530	......	7.0	13.1	......	53.4	3.75	4.0	93.8	5.2	1.9	36.5
70.9	80.2	14.83	1,450	......	6.0	12.6	......	47.6	3.5	3.9	89.7	4.7	2.0	42.6
71	84.3	14.50	......	......	7.1	......	......	......	3.6	3.95	91.2	5.0	2.4	48
71.1	85.1	14.63	1,390	......	......	12.9	......	......	4.0	4.0	100	4.9	2.0	40.8
71.1	83.8	14.57	1,300	......	6.7	12.8	......	53.1	3.35	3.85	87.0	4.9	2.1	42.9
71.2	88.4	14.57	1,390	......	7.2	12.5	......	57.6	3.7	3.8	97.4	5.3	1.9	35.8
71.2	82.5	14.83	1,420	......	7.5	12.4	......	60.5	3.5	3.6	97.2	5.1	2.2	43.1
71.2	90.7	14.10	1,180	10.7	6.6	13.5	79.3	48.9	3.3	3.85	85.7	4.8	1.9	39.6
71.4	82.6	14.37	......	......	......	13.1	......	......	3.5	3.85	90.9	4.9	2.1	42.9
71.7	88.7	14.87	1,380	......	6.4	12.7	......	50.4	3.5	3.9	89.7	4.5	2.0	44.4
72.1	85.7	14.67	1,420	......	7.2	12.7	......	56.7	3.8	3.9	97.4	5.4	2.1	38.9
72.2	84.5	14.70	1,320	......	6.6	13.2	......	50	3.2	3.8	84.2	4.8	2.2	45.8
72.3	84	15.33	1,510	......	7.2	13.2	......	54.6	3.9	3.9	100	5.0	1.9	38
72.5	80.8	14.33	1,290	......	7.1	13.1	......	54.2	3.65	3.9	93.6	5.2	2.2	42.3
73.3	88	14.33	1,280	......	......	12.9	......	......	3.4	3.9	87.2	5.0	2.0	40
73.3	84.5	14.70	1,390	......	7.3	......	......	......	3.6	3.95	91.2	5.0	2.2	44
73.4	87.8	15.30	......	12.1	7.3	13.6	89	53.7	3.85	4.0	96.2	......	......	......
73.6	79.8	14.73	1,330	......	7.1	12.8	......	55.5	3.45	3.85	89.6	5.2	2.4	46.2
73.9	85	14.53	1,170	......	6.6	12.4	......	53.2	3.5	3.75	93.4	5.0	1.9	38
74.3	86.6	14.57	1,370	......	6.6	12.7	......	52	3.5	3.7	94.6	5.1	2.4	47.1
75.8	83.8	15.13	1,490	......	7.2	13.4	......	53.7	3.6	3.9	92.3	5.2	2.1	40.4
76.1	90.3	15.60	1,370	......	......	......	......	......	3.7	3.95	93.7	5.1	2.2	43.1
76.7	85.5	14.47	1,270	......	6.9	......	......	......	3.45	3.75	92.0	......	......	......
77	81.3	14.77	1,385	......	7.5	......	......	......	3.5	3.9	89.7	5.1	2.1	41.2
78.6	88.5	15.20	1,400	11.2	7.0	13.8	81.2	50.7	3.5	4.0	87.5	5.2	2.4	46.2
......	......	......	......	......	6.6	......	......	......	3.5	3.9	89.7	4.7	2.1	44.7
......	......	......	......	......	7.3	......	......	......	......	......	......	5.1	2.0	39.2
......	......	......	......	......	7.0	......	......	......	3.5	3.9	89.7	4.9	1.9	38.8
......	......	......	......	......	6.5	......	......	......	3.4	3.8	89.5	5.0	2.2	44
......	......	......	......	......	6.7	......	......	......	3.55	4.08	87.0	5.2	2.2	42.3
......	......	......	......	......	6.6	......	......	......	3.8	3.9	97.4	5.1	2.2	43.1
......	......	......	......	......	7.1	......	......	......	3.45	3.7	93.2	5.0	2.2	44
(37)	(37)	(37)	(34)	(3)	(34)	(29)	(3)	(22)	(42)	(42)	(42)	(40)	(41)	(40)
......	......	......	......	34	234.2	374.4	......	......	149.6	163.08	......	200.2	88.3	......
71.9	84.8	14.71	1,347	11.33	6.88	12.9	83.1	53.8	3.56	3.88	91.8	5	2.15	43.2

Northeastern Eskimo crania.[1]

MALE.

Catalogue No. (A. M. N. H.)	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (*glabella ad maximum*).	Diam. lateral maxim.	Basion-Bregma height.
99-108	Capt. Peary	Smith Sound	Adult		19.3	14.1	14.2
'9	do	do	do		19.4	14.5	14.2
'11	do	do	do		19	14.3	14
'3610	Capt. Peary (N. Y.).	do	do		19.1	14.4	13.6
'110	Capt. Peary	do	do		18.5	14.1	13.8
'5	do	do	do		19.1	14.8	14.6
'3607	Capt. Peary (N. Y.).	do	do		18.3	14.4	14
Total					(7) 132.7	(7) 100.6	(7) 98.4
Average					*18.96*	*14.37*	*14.06*

FEMALE.

99-106	Capt. Peary	Smith Sound	Adult		18.4	13.8	13.9
'3608	do	do	do		17.6	13.8	13.4

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[1] See author's Contribution to the Anthropology of the Central and Smith Sound Eskimo, Anthrop. Papers, Amer. Mus. Nat. Hist., N. Y., 1910, vol. 5, pt. 2.

Baffin Land Eskimo crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (*glabella ad maximum*).	Diam. lateral maxim.	Basion-Bregma height.
242,754	Var	Cumberland Gulf	Adult		19.1	13.5	14.5
'834		do	do		17.9	13.2	13.5
'830		do	do		18.6	14	13.2
'792		do	do		18.2	13.8	14
Total					(4) 73.8	(4) 54.5	(4) 55.2
Average					*18.45*	*13.62*	*13.8*

FEMALE.

242,765	Var	Cumberland Gulf	Adult		18	12.4	12.9
'696		do	do		18.5	13.2	13.4
'731		do	do		18.4	13.5	13
'705		do	do		18.6	13.8	13.8
'708		do	do		18.7	......	13.5
Total					(5) 92.2	(4) 52.9	(5) 66.6
Average					*18.44*	*13.22*	*13.32*

Northeastern Eskimo crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
73.1	*85*	15.90	1,545	11.9	7.8	14.2	*83.8*	*54.9*	3.75	4.05	*92.4*	5.6	2.35	*42*
74.7	*83.8*	16.03	....	12.9	8.3	15.2	*84.9*	*54.6*	3.5	4.22	*82.9*	6.1	2.3	*37.7*
75.3	*84.1*	15.77	1,590	11.7	7.2	15	*78*	*48*	3.3	4.18	*79*	5.8	2.4	*41.4*
75.4	*81.2*	15.70	1,600	12.1	7.4	14	*86.4*	*52.9*	3.37	3.85	*86.5*	5.6	2.1	*37.5*
76.2	*84.6*	15.47	1,445	......	7.7	14.5	....	*53.1*	3.57	4.1	*87.2*	5.7	2.2	*38.6*
77.5	*86.1*	16.17	1,645	12.3	7.8	15.8	77.8	*49.4*	3.78	4.28	[2] *87.2*	5.95	2.45	*41.2*
78.7	*85.6*	15.60	1,570	11.9	7.3	14.1	*85*	*51.8*	3.5	4.12	*84.8*	5.4	2.15	*39.8*
(7) *75.8*	(7) *84.4*	(7) 110.64 *15.81*	(6) 9,395 *1,566*	(6) 72.8 *12.13*	(7) 53.5 *7.64*	(7) 102.8 *14.7*	(6) *82.4*	(7) *52*	(7) 24,775 *3.54*	(7) 28.8 *4.11*	(7) *86.7*	(7) 40.1 *5.73*	(7) 15.9 *2.27*	(7) *39.7*

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total*	*Facial Index, upper*	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
75	*86.3*	15.37	1,510	11.2	6.9	13.4	*83.6*	*51.5*	3.65	4.07	*89.5*	5.5	2.3	*41.8*
78.4	*85.4*	14.90	....	11.2	6.7	13	*86.1*	*51.5*	3.38	3.85	*88.5*	5.1	2.35	*46.1*

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[2] Orbits: Height, r. 3.7, l. 3.75; breadth, r. 4.4, l. 4.15; *O. I.*, r. *84.1*, l. *90.4*. Nothing pathological.

Baffin Land Eskimo crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
70.7	*89*	15.70	1,620	......	7.4	14.3	....	*51.8*	3.7	3.9	*94.9*	5.4	2.1	*38.9*
73.7	*86.8*	14.87	1,380	12.5	7.6	14.1	*88.6*	*53.9*	3.4	4	*85*	5.3	2.5	*47.2*
75.5	*81*	15.27	1,360	11.8	7.4	13.2	*89.4*	*56.1*	3.4	3.8	*89.5*	4.9	2.1	*42.9*
75.3	*87.5*	15.33	1,570	11.3	7	14.2	*79.6*	*49.3*	3.5	3.8	*92.1*	5.3	2	*37.7*
(4) *73.8*	(3) *86*	(4) *15.29*	(4) 5,930 *1,483*	(3) 35.6 *11.9*	(4) 29.4 *7.35*	(4) 55.8 *13.95*	(3) *85.9*	(4) *52.7*	(4) 14 3.5	(4) 15.5 3.87	(4) *90.3*	(4) 20.9 5.22	(4) 8.7 2.17	(4) *41.6*

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total*	*Facial Index, upper*	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
68.9	*84.0*	14.43	1,355	......	6.2	12.7	....	*48.8*	3.6	4	*90*	4.8	2.3	*47.9*
71.4	*84.5*	15.08	1,415	11.5	7	13.1	*87.8*	*53.4*	3.5	4	*87.5*	5.1	2.1	*41.2*
73.4	*82*	14.97	1,420	11.1	7	12.8	*86.7*	*54.7*	3.3	3.6	*91.7*	5	2.1	*42*
74.9	*85.2*	15.40	1,420	......	7.2	13.6	....	*52.9*	3.4	3.9	*87.2*	5.3	2.3	*43.4*
......	......	....	....	......	6.6	....	....	....	3.7	4	*92.5*	5.1	2.3	*45.1*
(4) *72*	(4) *84*	(4) *14.96*	(4) 5,610 *1,403*	(2) 22.6 *11.3*	(5) 34 *6.8*	(4) 52.2 *13.05*	(2) *87.3*	(4) *52.5*	(5) 17.5 *3.5*	(5) 19.5 *3.9*	(5) *89.7*	(5) 25.3 *5.06*	(5) 11.1 *2.22*	(5) *43.9*

"*Central*" *Eskimo crania.*[1]

MALE.

Catalogue No. (A. M. N. H.)	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
99-4661......	Capt. Geo. Comer.	Southampton Island.	Adult.....	....	20.4	14	13.5
'2......	.....do..........	.....do..........	..do.....	....	19.1	13.9	14.5
'4102......	.....do..........	.....do..........	..do.....	....	18.9	13.8	13.4
'4654......	.....do..........	.....do..........	..do.....	....	19.3	14.1	14.3
'3......	.....do..........	.....do..........	..do.....	....	18.6	13.9	13.9
'9......	.....do..........	.....do..........	..do.....	....	19	14.2	14
'2......	.....do..........	.....do..........	..do.....	....	18.3	14	14.5
'4104......	.....do..........	.....do..........	..do.....	....	18.7	14.4	14.1
"Z"......	.....do..........	.....do..........	..do.....	....	17.9	14	13.9
"X"......	.....do..........	Lyon Inlet, Melville Peninsula.	..do.....	....	19.6	13.7	13.6
					(10)	(10)	(10)
Total....	....	....	....	....	189.8	140.0	139.7
Average.	....	....	....	....	*18.98*	*14*	*13.97*

FEMALE.

Catalogue No. (A. M. N. H.)	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
99-4656......	Capt. Geo. Comer.	Southampton Island.	Adult.....	....	18.3	13.4	13.8
'60......	.....do..........	.....do..........	..do.....	....	18.6	13.7	13.8
'4107......	.....do..........	.....do..........	..do.....	....	19	14.2	13.5
"Y"......	.....do..........	.....do..........	..do.....	....	18.1	13.8	13.9
'4655......	.....do..........	.....do..........	..do.....	....	17.4	13.4	13.1
'4103......	.....do..........	Frozen Straits, Southampton Island.	..do.....	....	17.6	13.7	14.05
					(6)	(6)	(6)
Total....	....	....	....	....	109	82.2	82.15
Average.	....	....	....	....	*18.17*	*13.7*	*13.69*

Alaska Eskimo crania.

MALE.

NORTH COAST.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
242,933......	Miscellaneous...	Point Barrow.....	Adult.....	....	18.9	13.4	13.9
'28......	....	.....do..........	..do.....	....	17.8	12.9	13.6
'31......	....	.....do..........	..do.....	....	18.4	13.6	13.1
'5......	....	.....do..........	..do.....	....	18.5	14	13.8
'27......	....	.....do..........	..do.....	....	18.4	14.5	13.2
					(5)	(5)	(5)
Total....	....	....	....	....	92	68.4	67.6
Average.	....	....	....	....	*18.4*	*13.68*	*13.52*

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[1] See author's Contribution to the Anthropology of the Central and Smith Sound Eskimo, Anthrop. Papers, Amer. Mus. Nat. Hist., New York, 1910, vol. 5, pt. 2, pp. 177-280, 15 pls.

"Central" Eskimo crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
68.6	78.5	16	1,775	12.6	7.5	14.7	85.7	51	3.5	4.17	83.9	5.6	2.55	45.5
72.8	87.9	15.80	1,540	13.2	7.9	14.8	89.2	53.4	3.55	4.08	87.1	5.6	2.5	44.6
73.0	88	15.83	1,410	12.4	7.6	14.5	85.5	58.4	3.47	4.1	84.8	5.35	2.2	41.1
73.1	85.6	15.90	1,725	(?)	7.8	14.3	......	54.5	3.68	4.18	88.6	5.3	2.4	45.3
74.7	85.5	15.50	1,583	(?)	7.6	14.7	......	51.7	3.7	4	92.5	5.3	2.15	40.6
74.7	84.3	15.70	1,600	12.8	7.8	14.2	90.1	54.9	3.55	4.05	87.7	5.2	2.2	42.3
76.5	89.8	15.60	1,455	(?)	7.7	14.4	......	53.5	3.6	3.9	92.3	5.4	2.35	43.5
77	85.2	15.73	1,485	12.6	7.7	14.5	86.9	53.9	4.2	4.28	98.2	5.55	2.15	38.7
78.2	87.1	15.27	1,495	12.2	7.4	14.2	85.9	52.1	3.77	3.82	98.4	5.6	2.2	39.3
70	81.7	15.63	......	12.8	8	......	......	......	3.9	4.3	90.7	5.4	2.45	45
(10)	(10)	(10)	(9)	(7)	(10)	(9)	(6)	(9)	(10)	(10)	(10)	(10)	(10)	(10)
......	......	156.5	14,068	88.6	7.7	130.3	......	......	36,925	40,875	......	54.3	23.15	......
73.8	84.7	15.65	1,563	12.66	7.7	14.48	87.2	53	3.69	4.09	90.3	5.43	2.31	42.6

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
73.2	87.1	15.18	......	......	......	......	......	......	......	......	......	......	......	......
73.7	85.4	15.36	1,515	12.3	7.6	14	87.9	54.3	3.57	4.12	86.6	5.2	2.3	44.2
74.7	81.3	15.57	[1] 1,580	......	7.4	13.5	......	54.8	3.8	4.28	89	5.2	2.15	41.3
75.7	84.5	15.28	1,450	11.7	7.3	13.5	86.7	54.1	3.85	3.7	(109)	5.3	2.2	41.5
77	82.4	14.60	1,290	......	6.6	14.3	......	48.1	3.5	3.92	89.1	4.75	2.3	48.4
77.8	89.8	15.12	1,380	11	6.8	13.8	79.7	49.3	3.47	4.2	82.7	4.85	2.1	43.3
(6)	(6)	(6)	(5)	(3)	(5)	(5)	(3)	(5)	(5)	(5)	(4)	(5)	(5)	(5)
......	......	91.11	7,215	35	35.7	69.1	......	......	18.2	20,225	......	25.3	11.05	......
75.4	85.9	15.18	1,443	11.7	7.14	13.82	84.8	51.7	3.64	4.05	86.6	5.06	2.21	43.7

Alaska Eskimo crania.

MALE.

NORTH COAST.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
70.9	86.1	15.03	1,285	......	8	14.5	......	55.2	3.4	4.2	81	5.8	2.5	43.1
72.6	88.6	14.77	1,250	12.6	7.8	14.2	88.7	54.9	3.8	4.1	92.7	5.7	2.4	42.1
73.9	81.9	15.08	1,300	......	6.9	14.6	......	47.3	3.7	4.1	90.2	5.5	2.4	43.6
75.7	84.9	15.43	1,505	......	7.7	......	......	......	3.6	3.9	92.3	5.5	1.9	34.6
75.8	80.2	15.33	1,540	......	8.3	14.2	......	58.4	3.8	4.3	88.4	6.1	2.1	34.4
(5)	(5)	(5)	(5)	(1)	(5)	(4)	(1)	(4)	(5)	(5)	(5)	(5)	(5)	(5)
......	......	......	6,880	12.6	38.7	57.5	......	......	18.3	20.6	......	28.6	11.3	......
74.3	84.3	15.20	1,376	......	7.74	14.4	......	53.9	3.66	4.12	88.8	5.72	2.26	39.6

Alaska Eskimo crania—Continued.

MALE—Continued.

KOTZEBUE SOUND.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
242,947		Point Hope	Adult		17.8	13.4	13.9
'888		do	do		18.3	13.8	14.4
'786		Kotzebue Sound	do		17.6	13.5	13.7
'895		Point Hope	do		17.9	13.8	13.9
300,216		Kobuk River	do		17.4	13.6	13.6
242,923		Point Hope	do	Slight asymmetry.	18.2	14.4	14
					(6)	(6)	(6)
Total					107.2	82.5	83.5
Average					*17.87*	*13.75*	*13.92*

NORTON SOUND.

248,578		Fort St. Michael	Adult		18.2	13.5	13.9
242,764		do	do		18.3	13.6	14
228,285		do	do		18.9	14.2	14.8
242,785		do	do		18.6	14.1	14.6
248,577		do	do		18.1	14.1	13.7
242,814		do	do		17.8	14	12.7
'876		do	do		18	14.2	13.8
					(7)	(7)	(7)
Total					127.9	97.7	97.5
Average					*18.27*	*13.96*	*13.93*

MISCELLANEOUS.

243,993	U. S. N. M	"Alaska"	Adult		18.8	13.7	13.8
242,750		Bering Sea Islands	do		18.5	13.7	14.3
'2		Nunivak Island	do		18.4	13.7	13.5
'828		"Alaska"	do		18.8	14.2	13.8
225,039		Prince William Sound.	do		18.2	13.8	12.9
242,756		Bering Sea Islands	do		18.3	14.1	13
255,603		Sitkalidak Island	do		18.6	14.4	14
228,795		S. E. Alaska	do		19.1	15	13.9
317,053		Port Moller	do		17.9	14.2	13.7
					(9)	(9)	(9)
Total					166.6	126.8	122.9
Average					*18.51*	*14.09*	*13.66*

FEMALE.

NORTH COAST.

242,898	Miscellaneous	Point Barrow	Adult		18.1	13.6	12.9
'934		do	do		17.9	13.5	12.6
'896		do	do		17.2	13.1	12.2
					(3)	(3)	(3)
Total					53.2	40.2	37.7
Average					*17.73*	*13.4*	*12.57*

Alaska Eskimo crania—Continued.

MALE—Continued.

KOTZEBUE SOUND.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
75.3	89.1	15.03	1,375	13	7.6	13.8	94.2	55.1	3.6	3.9	92.3	5.5	2.4	43.6
75.4	89.7	15.50	1,575	......	8.1	14.1	....	57.4	3.8	4.2	90.5	5.9	2	33.9
76.7	88.1	14.93	1,385	......	7.3	14.3	....	51	3.6	4	90	5.2	2.3	44.2
77.1	87.7	15.20	1,535	......	....	14.7	....	....	3.7	4	92.5	5.5	2.3	41.8
78.2	87.7	14.87	1,300	11.8	7	13.3	88.7	51.9	3.4	3.8	89.5	4.9	2.6	53.1
79.1	86.9	15.53	1,630	......	7.2	15.2	....	47.4	3.7	4.1	90.2	5.3	2.2	41.5
(6)	(6)	(6)	(6)	(2)	(5)	(6)	(2)	(5)	(6)	(6)	(6)	(6)	(6)	(6)
......	......	......	8,800	24.8	37.2	85.4	....	....	21.8	24	....	32.3	13.8	....
77	88	15.18	1,467	12.4	7.44	14.23	92.2	52.6	3.63	4	90.8	5.4	2.3	42.4

NORTON SOUND.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
74.2	87.7	15.20	1,440	12.7	7.9	14.2	89.4	55.6	3.9	3.9	100	5.4	2.2	40.7
74.3	87.8	15.30	1,520	......	7	13.8	....	50.7	3.7	4.1	90.2	5.5	2.2	40
75.1	89.4	15.97	....	14	8.3	14.3	97.9	58	3.8	4	95	5.8	2.4	41.4
75.8	89.3	15.77	1,665	......	7.8	13.6	....	57.4	....	....	....	5.5	2.3	41.8
77.9	85.1	15.30	1,440	13.2	7.9	13.8	95.6	57.2	3.7	3.9	94.9	5.4	2.2	40.7
78.6	79.9	14.83	1,400	12.2	7.6	13.8	88.4	55.1	3.7	4	92.5	5.4	2.2	40.7
78.9	85.7	15.33	1,570	......	....	14.3	....	....	3.9	4.2	92.9	5.8	2.2	37.9
(7)	(7)	(7)	(6)	(4)	(6)	(7)	(4)	(6)	(6)	(6)	(6)	(7)	(7)	(7)
......	......	......	9,035	52.1	46.5	97.8	....	....	22.7	24.1	....	38.8	15.7	....
76.4	86.4	15.39	1,506	13.02	7.75	13.97	92.9	55.7	3.8	4.02	94.2	5.54	2.24	40.5

MISCELLANEOUS.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
72.9	88.4	15.43	....	......	7.4	....	....	....	3.4	3.8	89.5	5.3	2.3	43.4
74	88.8	15.50	1,540	......	7.9	13.4	....	59	3.85	4.05	95	5.4	2.6	48.2
74.5	84.1	15.20	1,470	......	7.7	13.8	....	55.8	3.7	4.3	86	5.3	2.4	45.3
75.5	83.6	15.60	1,590	......	6.8	14.4	....	47.2	3.55	3.9	91	5.3	2.1	39.6
75.8	80.6	14.97	1,435	......	7.4	13.4	....	55.2	3.5	4	87.5	4.9	2.4	49
77	80	15.13	1,370	......	7	14.1	....	49.6	3.4	3.7	91.9	5	2.4	48
77.4	84.8	15.67	1,520	......	7.2	....	....	....	3.6	4.1	87.8	5.2	2.5	48.1
78.5	81.5	16	1,590	......	7	14.6	....	47.9	3.4	4.1	82.9	5	2.7	54
79.3	85.4	15.27	1,430	......	....	14.1	....	....	3.7	4	92.5	5.4	2.4	44.4
(9)	(9)	(9)	(8)	......	(8)	(7)	....	(6)	(9)	(9)	(9)	(9)	(9)	(9)
......	......	......	11,945	......	58.4	97.8	....	....	32.1	35.95	....	46.8	21.8	....
76.1	83.8	15.42	1,493	......	7.3	13.97	....	52.3	3.57	4	89.3	5.2	2.42	46.6

FEMALE.

NORTH COAST.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
75.1	81.4	14.87	1,305	......	7.3	13.2	....	55.3	3.5	4	87.5	5.3	2.3	43.4
75.4	80.2	14.67	1,375	......	7	12.8	....	54.7	3.7	3.9	94.9	5.1	2.2	43.1
76.2	80.5	14.17	1,160	......	6.9	12.2	....	56.6	3.3	3.8	86.8	5	2	40
(3)	(3)	(3)	(3)	......	(3)	(3)	....	(3)	(3)	(3)	(3)	(3)	(3)	(3)
......	......	......	3,840	......	21.2	38.2	....	....	10.5	11.7	....	15.4	6.5	....
75.6	80.7	14.57	1,280	......	7.1	12.7	....	55.5	3.5	3.9	89.7	5.13	2.17	42.2

Alaska Eskimo crania—Continued.

FEMALE—Continued.

NORTON SOUND.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
225,020	Miscellaneous	Fort St. Michael	Adult		17.9	13.2	13.8
242,781		Norton Sound	do		18.3	13.5	13.8
'2		do	do		17.6	13	12.9
'3		do	do		17.3	13.2	12.6
255,802		Fort St. Michael	do		18.1	13.9	13.4
					(5)	(5)	(5)
Total					89.2	66.8	66.5
Average					*17.84*	*13.36*	*13.3*

MISCELLANEOUS.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.
242,921	Miscellaneous	Point Hope	Adult		17.7	13.2
243,982		"Alaska"	do		17.6	13.4
242,751		Bering Sea Islands	do		17.7	13.6
'891		"Alaska"	do		17.8	13.8
243,981		do	do		17.2	13.4
242,894		do	do		17.8	14
243,979		Nunivak Island	do		17.4	13.8
242,753		Bering Sea Islands	do		17.9	14.2
'883		Point Clarence	do		17.3	13.8
243,983		"Alaska"	do		17.4	14.1
					(10)	(10)
Total					175.8	137.3
Average					*17.58*	*13.73*

TOTAL ALASKA ESKIMO—MALES.

					(27)	(27)	(27)
Total					493.7	375.4	371.5
Average					*18.29*	*13.90*	*13.76*

TOTAL ALASKA ESKIMO—FEMALES.

					(18)	(18)	(18)
Total					318.2	244.3	237.4
Average					*17.68*	*13.57*	*13.19*

Alaska Eskimo crania—Continued.

FEMALE—Continued.

NORTON SOUND.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
73.7	*88.7*	14.97	1,310	11.3	7.2	13	*86.9*	*55.4*	3.6	3.7	*97.3*	5	2.1	*42*
73.8	*86.8*	15.20	1,450	......	7	12.9	....	*54.3*	3.4	4	*85*	5.1	2.1	*41.2*
73.9	*84.3*	14.50	1,230	......	....	13.1	....	....	3.6	3.8	*94.7*	5	2.2	*44*
76.3	*82.6*	14.37	1,270	10.6	6.6	12.9	*82.2*	*51.2*	3.6	3.6	*100*	4.7	2.1	*44.7*
76.8	*83.8*	15.13	1,400	......	....	13.5	....	....	3.9	4	*97.6*	5.1	2.4	*47.1*
(5)	*(5)*	(5)	(5)	(2)	(3)	(5)	*(2)*	*(3)*	(5)	(5)	*(5)*	(5)	(5)	*(5)*
......	......	......	6,660	21.9	20.8	65.4	....	....	18.1	19.1	....	24.9	10.9	....
74.9	*85.3*	14.83	1,332	*10.95*	*6.93*	*13.08*	*84.6*	*53.6*	3.62	3.82	*94.8*	*4.98*	*2.18*	*43.8*

MISCELLANEOUS.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
74.6	*84.1*	14.63	1,290	......	6.8	13.4	....	*50.8*	3.5	3.9	*89.7*	5.4	2.2	*40.7*
76.1	*87.7*	14.87	1,350	......	7.2	13.3	....	*54.1*	3.6	4.05	*88.9*	5	2.6	*52*
76.8	*87.5*	15	1,410	......	7.1	....	....	....	3.6	3.8	*94.7*	5.2	2.3	*44.2*
77.5	*89.2*	15.23	1,460	......	7.5	13.6	....	*55.2*	3.5	3.8	*92.1*	5.9	2.3	*39*
77.9	*86.9*	14.63	1,310	......	....	....	....	....	....	....	....	....	....	....
78.6	*83.6*	15.03	1,410	......	(7.8)	(12.7)	....	*(61.4)*	4	3.95	*101.3*	5.5	2.5	*45.4*
79.3	*83.3*	14.73	1,300	......	6.9	12.8	....	*53.9*	3.6	3.8	*94.7*	5	2.2	*44*
79.3	*82.2*	15.10	1,430	......	....	13.4	....	....	3.4	4	*85*	5	2.5	*50*
79.8	*81.7*	14.60	1,340	......	6.6	13	....	*50.8*	3.5	3.8	*92.1*	4.9	2.3	*46.9*
81	*84.4*	14.93	1,420	......	7	13.2	....	*53*	3.7	3.8	*97.4*	4.8	2.5	*52.1*
(10)	*(10)*	(10)	(10)	......	(7)	(7)	....	(6)	(9)	(9)	*(9)*	(9)	(9)	*(9)*
......	......	......	13,720	......	49.1	92.7	....	....	32.4	34.9	....	46.7	21.4	....
78.1	*85.1*	*14.88*	*1,372*	......	7	*13.24*	....	*53*	*3.6*	*3.88*	*92.9*	*5.2*	*2.4*	*45.8*

TOTAL ALASKA ESKIMO—MALES.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
(27)	*(27)*	(27)	(25)	(7)	(24)	(24)	(7)	*(21)*	*(26)*	(26)	*(26)*	(27)	(27)	*(27)*
......	......	....	36,660	89.7	180.8	338.5	....	....	94.9	104.65	....	146.5	62.6	....
78	*85.5*	*15.32*	*1,466*	*12.8*	7.53	*14.1*	*91.9*	*53.7*	*3.65*	*4.02*	*90.7*	*5.42*	*2.32*	*43.7*

TOTAL ALASKA ESKIMO—FEMALES.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
(18)	*(18)*	(18)	(18)	(2)	(13)	(15)	*(2)*	*(12)*	(17)	(17)	*(17)*	(17)	(17)	*(17)*
......	......	....	24,220	21.9	91.1	196.3	....	....	61	65.7	....	87	38.8	....
76.8	*84.4*	*14.81*	*1,346*	*10.95*	7	*13.1*	*88.4*	*53.7*	*3.59*	*3.86*	*92.8*	*5.12*	*2.28*	*44.6*

Chuckchi, Siberia, crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
225,028		Arickamchicho Island, Bering Strait.	Adult		18.4	14.2	13.2
225,025		Plover Bay	do		18.7	14.7	13.2
225,032		Port Providence	do	Very slight asymmetry.	18.7	15.0	13.8
225,026		Plover Bay	do		18.4	14.8	13.6
225,033		Port Providence	do		18.9	......	13.0
					(5)	(4)	(5)
Total					93.1	58.7	66.8
Average					*18.62*	*14.67*	*11.36*

Eskimo, St. Lawrence Island, crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
279,453		North coast	Adult		19.8	14.1	13.4
279,453		do	do		19.1	13.7	13.4
279,550		do	do		19.5	14.0	13.4
248,988		do	do		19.1	13.8	13.7
279,434		do	do		18.1	13.1	13.2
279,439		do	do		19.5	14.2	13.4
279,385		do	do		19.1	13.9	13.4
279,465		do	do		18.1	13.2	13.4
279,559		do	do		18.8	13.7	......
279,473		do	do	Slight asymmetry.	18.9	13.8	14.0
279,515		do	do		18.6	13.6	13.8
279,396		do	do		19.4	14.2	......
279,425		do	do		18.4	13.5	14.2
279,555		do	do		18.8	13.8	13.1
228,281		do	do		19.2	14.1	14.0
279,510		do	do		19.0	14.0	13.8
279,573		do	do		18.4	13.6	13.5
279,487		do	do		18.5	13.7	13.8
279,474		do	do		18.6	13.8	13.7
279,508		do	do		18.6	13.8	13.4
279,501		do	do		18.7	13.9	13.4
242,889		do	do		18.3	13.6	13.1
279,382		do	do		18.8	14.0	13.5
279,492		do	do		20.0	14.9	14.3
279,377		do	do		18.5	13.8	......
242,805		do	do		18.6	13.9	14.3
243,992		do	do	Slight asymmetry.	19.1	1.43	14.0
279,488		do	do		18.7	14.0	13.7
279,665		do	do		18.7	14.0	13.8
279,581		do	do		19.5	14.6	13.4
279,419		do	do		18.8	14.1	13.4
279,505		do	do		18.4	13.8	13.8
279,572		do	do		19.2	14.4	13.8
279,529		do	do		18.4	13.8	13.9
279,541		do	do		18.2	13.7	......
279,547		do	do		18.6	14.0	13.8
279,416		do	do		18.3	13.8	13.7

Chuckchi, Siberia, crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
77.2	81	15.27	1,495	......	8.2	14.6	......	56.2	3.55	4.05	87.7	6.1	2.3	37.7
78.0	79	15.53	1,535	......	7.7	14.3	......	53.5	3.6	4.1	87.8	5.6	2.2	39.3
80.2	81.0	15.83	1,530	......	......	14.4	......	......	3.9	4.1	95.1	5.7	2.4	42.1
80.4	81.8	15.60	1,650	11.3	7.4	13.2	85.6	56.1	3.3	3.8	86.8	5.2	2.6	50
......	......	......	......	......	7.1	13.3	......	53.4	3.6	4.0	90	5.5	2.3	41.8
(4)	(4)	(4)	(4)	......	(4) 30.4	(5) 69.8	......	(4)	(5) 17.95	(5) 20.05	(5)	(5) 28.1	(5) 11.8	(5)
79.1	81	15.56	1,552	......	7.6	13.96	......	54.9	3.59	4.01	89.5	5.62	2.36	42

Eskimo, St. Lawrence Island, crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
71.2	79.1	15.77	1,620	......	7.2	14.1	......	51.1	3.8	4.1	92.7	5.8	2.7	46.6
71.7	81.7	15.40	1,360	......	7.7	14.3	......	53.8	3.7	4.15	89.2	5.4	2.5	46.3
71.8	80.0	15.63	1,560	......	7.9	13.8	......	57.2	3.4	4.05	84	5.6	2.9	51.8
72.2	83.3	15.53	1,465	12.5	8.2	14.9	83.9	55.0	3.7	4.3	86	5.9	2.4	40.7
72.4	84.6	14.80	1,375	......	8.3	14.4	......	57.4	3.8	4.2	90.5	5.9	2.8	47.5
72.8	79.5	15.70	1,485	......	8.0	14.6	......	54.8	3.7	4.3	86	5.7	2.6	45.6
72.8	81.2	15.47	1,510	......	7.9	13.8	......	57.2	4.1	4.3	95.4	5.4	2.4	44.4
72.9	85.6	14.90	1,305	......	7.5	13.0	......	57.7	3.7	3.8	97.4	5.3	2.5	47.2
72.9	......	......	......	......	......	......	......	......	......	......	......	......	......	......
73.0	85.6	15.57	1,445	......	7.9	13.8	......	57.2	3.85	4.3	89.5	5.5	2.4	43.6
73.1	85.7	15.33	1,500	......	8.2	13.6	......	60.3	3.65	4.05	90.1	5.5	2.3	41.8
73.2	......	......	......	......	7.8	14.2	......	54.9	4.05	4.35	93.1	5.6	2.6	46.4
73.4	86.3	15.37	......	......	7.6	13.2	......	57.6	3.9	4.05	96.3	5.5	2.4	43.6
73.4	80.4	15.23	1,450	......	6.9	13.6	......	50.7	3.5	4.15	84.4	5.0	2.8	56
73.4	84.1	15.77	1,620	......	7.5	14.6	......	51.4	3.9	4.2	92.9	5.6	2.5	44.6
73.7	83.6	15.60	......	......	7.6	13.0	......	58.5	3.5	4.15	84.4	5.5	2.3	41.8
73.9	84.4	15.17	1,300	11.5	7.5	13.5	85.2	55.6	3.72	3.8	97.9	5.3	2.4	45.3
74.0	85.7	15.33	......	......	......	13.5	......	......	3.85	3.9	98.7	5.2	2.4	46.2
74.2	84.6	15.37	1,500	......	......	13.2	......	......	3.7	4.0	92.5	5.9	2.6	44.1
74.2	82.7	15.27	1,480	......	7.8	13.5	......	57.8	3.65	4.05	90.1	5.5	2.5	45.4
74.3	82.2	15.33	1,550	......	7.5	14.1	......	53.2	3.7	4.0	92.5	5.4	2.3	42.6
74.3	82.1	15.00	1,370	......	7.3	14.2	......	51.4	3.65	3.75	97.4	5.7	2.3	40.4
74.5	82.3	15.43	1,405	......	7.5	14.1	......	53.2	3.7	4.0	92.5	5.6	3.0	53.6
74.5	81.9	16.40	1,810	......	7.7	15.4	......	50.0	3.8	4.3	88.4	6.2	2.5	40.3
74.6	......	......	......	......	7.9	13.7	......	57.7	3.9	4.0	97.5	5.5	2.6	47.3
74.7	88	15.60	1,540	12.2	7.6	14.2	85.9	53.5	3.4	4.0	85	5.6	2.4	42.9
74.9	83.8	15.80	1,565	......	8.1	13.9	......	58.3	3.75	4.0	93.8	5.8	2.3	39.7
74.8	88.6	15.47	1,535	......	7.7	13.3	......	57.9	3.5	3.85	90.9	5.3	2.2	41.5
74.9	84.4	15.50	......	......	7.4	14.7	......	50.3	3.75	4.2	89.3	5.9	2.8	47.5
74.9	76.4	15.83	1,640	12.7	8.1	14.8	85.8	54.7	3.65	3.95	92.4	6.1	2.7	44.3
75.0	81.5	15.43	1,570	......	7.7	12.8	......	60.2	3.7	3.85	96.1	5.5	2.5	45.4
75.0	85.7	15.33	1,430	......	8.1	13.7	......	59.1	3.7	3.9	94.9	5.8	2.6	44.8
75.0	88.1	15.80	1,590	......	8.0	14.0	......	57.1	3.5	3.75	93.4	5.6	2.3	41.1
75.0	88.3	15.33	......	......	......	13.3	......	......	3.7	4.0	92.5	5.1	2.3	45.1
75.3	......	......	......	......	7.7	13.6	......	56.6	......	......	......	5.6	2.6	46.4
75.5	84.7	15.47	1,430	11.6	7.3	13.9	83.4	52.5	3.5	4.0	87.5	5.3	2.3	43.4
75.4	85.4	15.27	1,540	......	7.8	14.4	......	54.2	3.8	4.25	89.4	5.7	2.5	43.9

Eskimo, St. Lawrence Island, crania—Continued.

MALE—Continued.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
243,987		North coast	Adult		18.3	13.8	13.8
279,505		do	do		17.9	13.5	13.5
279,549		do	do		19.1	14.4	......
279,560		do	do		18.0	13.6	13.3
279,446		do	do		18.5	14.0	14.2
242,807		do	do		17.7	13.4	13.7
242,703		do	do		18.6	14.1	14.2
279,394		do	do		19.0	14.4	......
279,580		do	do		18.2	13.8	13.7
279,520		do	do		17.8	13.5	13.2
279,490		do	do		18.7	14.2	13.4
279,577		do	do		17.4	13.2	13.0
279,450		do	do		18.3	13.9	13.7
242,916		do	do		18.4	14.0	14.2
242,770		do	do		18.4	14.0	14.1
279,517		do	do		18.4	14.0	13.5
279,521		do	do		17.6	13.4	......
279,539		do	do		18.8	14.3	13.8
279,546		do	do		18.9	14.4	14.5
242,772		do	do		18.5	14.1	13.4
241,891		do	do		18.6	14.2	14.0
279,455		do	do		18.6	14.2	13.6
279,563		do	do		18.2	13.9	13.6
279,423		do	do		18.3	14.0	13.8
279,538		do	do		18.3	14.0	13.9
279,387		do	do		18.8	14.4	14.2
227,484		do	do		18.4	14.1	13.4
279,485		do	do		18.8	14.4	13.2
279,432		do	do		18.8	14.4	13.5
279,500		do	do		18.4	14.1	13.4
279,524		do	do		18.0	13.8	14.0
279,409		do	do		19.0	14.6	14.3
241,883		do	do		18.5	14.2	14.1
279,493		do	do		18.1	13.9	......
279,486		do	do		18.6	14.3	......
279,464		do	do		18.2	14.0	13.5
279,575		do	do		18.6	14.3	14.4
279,556		do	do		18.2	14.0	......
279,535		do	do		18.7	14.4	14.2
279,388		do	do		18.7	14.4	13.8
279,655		do	do		19.1	14.7	13.9
242,802		do	do		17.9	13.8	14.0
242,776		do	do		18.4	14.2	14.1
279,470		do	do		18.0	13.9	13.3
279,496		do	do	Very slight asymmetry.	18.4	14.2	12.9
279,519		do	do		18.4	14.2	13.6
279,527		do	do		18.4	14.2	14.2
279,545		do	do		18.4	14.2	13.6
279,551		do	do		18.4	14.2	13.7
279,661		do	do		18.4	14.2	13.8
242,803		do	do		18.5	14.3	14.5
279,489		do	do		19.5	15.1	13.9
279,659		do	do		18.6	14.4	13.8
279,511		do	Near adult		18.2	14.1	14.0
242,908		do	Adult	Very slight asymmetry.	17.9	13.9	13.3
279,443		do	do		18.3	14.2	......
279,584		do	do		18.3	14.2	13.8
242,809		do	do		18.8	14.6	14.6
243,991		do	do		18.4	14.3	13.8
279,534		do	do		18.8	14.6	13.4
279,536		do	do		18.5	14.4	13.6
228,278		do	do		18.5	14.4	14.2
279,646		do	do		17.2	13.4	......
279,408		do	do		17.7	13.8	13.0
242,790		do	do		18.2	14.2	13.6
242,897		do	do		18.6	14.5	13.5
279,478		do	do		18.3	14.3	13.6
279,436		do	do		19.2	15.0	......

Eskimo, St. Lawrence Island, crania—Continued.

MALE—Continued.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
75.4	*86*	15.30	1,435	11.9	7.2	13.9	*85.6*	*51.8*	3.7	4.0	*92.5*	5.4	2.35	*43.6*
75.4	*86*	14.97	1,320	......	7.4	14.7	......	*50.3*	3.65	4.0	*91.2*	5.6	2.4	*42.9*
75.4	......	......	......	......	7.6	14.2	......	*53.5*	3.78	3.95	*95.6*	6.0	2.5	*41.7*
75.6	*84.2*	15.30	1,380	......	7.7	13.5	......	*57.0*	3.5	3.9	*89.7*	5.8	2.8	*48.3*
75.7	*87.4*	15.57	1,680	......	8.8	14.2	......	*62*	4.0	4.2	*95.2*	6.1	2.3	*37.7*
75.7	*88.1*	14.93	1,320	12.9	8.0	13.9	*92.8*	*57.6*	3.75	3.85	*97.4*	5.8	2.6	*44.8*
75.8	*86.8*	15.63	1,540	......	......	14.1	......	......	3.9	4.1	*95.1*	5.8	2.7	*40.6*
75.8	......	......	......	......	7.9	14.5	......	*54.5*	4.0	4.4	*90.9*	5.5	2.7	*49.1*
75.8	*85.6*	15.23	1,550	......	7.6	13.5	......	*56.3*	3.85	3.95	*97.5*	5.5	2.2	*40*
75.8	*84.4*	14.83	1,270	......	7.4	13.8	......	*53.6*	3.7	4.05	*91.4*	5.3	2.5	*47.2*
75.9	*79.1*	15.43	1,520	......	8.2	14.5	......	*56.6*	3.65	4.2	*86.9*	5.7	2.6	*45.6*
75.9	*85*	14.53	1,225	11.2	7.2	13.8	*81.2*	*52.2*	3.65	4.0	*91.2*	5.7	2.5	*43.9*
76	*85.1*	15.30	1,430	......	7.9	14.0	......	*56.4*	3.45	3.95	*87.4*	5.7	2.7	*47.4*
76.1	*87.6*	15.53	1,450	......	7.4	14.6	......	*50.7*	3.5	4.05	*86.4*	5.6	2.5	*44.6*
76.1	*87*	15.50	1,470	13.2	8.2	14.6	*90.4*	*56.2*	3.35	3.7	*90.5*	5.9	2.7	*45.8*
76.1	*83.5*	15.30	......	......	8.0	14.3	......	*55.9*	3.65	4.2	*86.9*	5.5	2.6	*47.3*
76.1	......	......	......	......	7.4	......	......	......	3.6	3.9	*92.3*	5.0	2.5	*50*
76.1	*83.4*	15.63	1,570	......	7.3	14.6	......	*50*	3.8	4.2	*90.5*	5.4	2.3	*42.6*
76.3	*87.1*	15.93	1,570	......	7.4	14.9	......	*49.7*	3.7	4.3	*86*	5.7	2.8	*49.1*
76.2	*82.2*	15.33	1,520	13.2	7.7	13.5	*97.8*	*57.0*	3.8	3.85	*98.7*	5.4	2.1	*38.9*
76.3	*85.4*	15.60	1,440	......	7.8	14.2	......	*54.9*	3.25	3.90	*85.3*	5.7	2.6	*45.6*
76.3	*82.9*	15.47	1,460	......	7.5	14.2	......	*52.8*	3.78	4.0	*94.5*	5.5	2.5	*45.4*
76.4	*84.7*	15.23	1,340	11.6	7.2	14.1	......	*51.1*	3.6	4.05	*88.9*	5.5	2.5	*45.4*
76.5	*85.4*	15.37	1,550	......	7.3	......	......	......	3.5	3.8	*92.1*	5.1	2.5	*49*
76.5	*86.1*	15.40	1,520	......	7.4	13.7	......	*54.0*	3.65	3.9	*93.6*	5.5	2.2	*40*
76.6	*85.5*	15.80	1,480	......	7.5	14.0	......	*53.6*	3.4	3.8	*89.5*	5.4	2.6	*48.2*
76.6	*82.5*	15.30	1,440	12.5	8.3	13.5	*92.6*	*61.5*	3.7	4.0	*92.5*	5.8	2.7	*46.6*
76.6	*79.5*	15.47	1,610	......	7.9	14.3	......	*55.2*	3.7	4.05	*91.4*	5.4	2.3	*42.6*
76.6	*81.3*	15.57	1,470	......	7.5	14.3	......	*52.4*	3.95	4.05	*97.5*	5.6	2.4	*42.9*
76.6	*82.5*	15.30	1,420	......	7.6	13.8	......	*55.1*	3.9	4.2	*92.9*	5.4	2.7	*50*
76.7	*88.0*	15.27	1,490	......	7.9	14.3	......	*55.2*	4.1	4.2	*97.6*	5.7	2.2	*38.6*
76.8	*85.1*	15.97	......	......	......	13.9	......	......	......	......	......	......	......	......
76.8	*86.2*	15.60	1,600	......	7.6	14.4	......	*52.7*	3.9	4.15	*94*	5.6	2.6	*46.4*
76.8	......	......	......	......	7.6	14.0	......	*54.3*	3.6	4.0	*90*	5.5	2.6	*47.3*
76.9	......	......	......	......	7.9	13.8	......	*57.2*	3.8	4.1	*92.7*	5.5	2.2	*40*
76.9	*83.8*	15.23	......	......	7.6	......	......	......	3.5	4.15	*84.4*	5.5	2.6	*47.3*
76.9	*87.5*	15.77	1,620	......	7.2	......	......	......	3.75	4.15	*90.4*	5.3	2.6	*49.1*
76.9	......	......	......	......	7.0	13.2	......	*53.0*	3.75	3.9	*96.2*	......	2.2	......
77	*85.8*	15.77	1,470	......	8.2	14.6	......	*56.2*	3.8	4.1	*92.7*	6.0	2.6	*43.3*
77	*83.4*	15.63	1,630	......	7.7	13.4	......	*57.5*	3.65	3.8	*96.0*	5.6	2.4	*42.9*
77	*82.2*	15.90	1,520	......	......	15.1	......	......	3.8	4.3	*88.4*	5.4	2.4	*44.4*
77.1	*88.3*	15.23	1,520	12.8	7.6	13.0	*98.5*	*58.5*	3.6	3.95	*91.2*	5.5	2.2	*40*
77.2	*86.5*	15.57	1,590	......	7.8	14.3	......	*54.5*	3.6	3.95	*91.2*	5.5	2.5	*45.4*
77.2	*83.4*	15.07	1,360	......	7.3	14.0	......	*52.1*	3.55	4.2	*84.5*	5.4	2.6	*48.2*
77.2	*79.1*	15.17	1,490	......	7.5	13.6	......	*55.2*	3.75	3.8	*98.7*	5.6	2.4	*42.9*
77.2	*86.4*	15.40	......	......	......	......	......	......	......	......	......	......	......	......
77.2	*87.1*	15.60	1,530	......	7.8	14.1	......	*55.3*	3.95	4.1	*96.3*	5.5	2.4	*48.6*
77.2	*88.4*	15.40	1,400	......	7.5	13.9	......	*54.0*	3.5	4.0	*87.5*	5.3	2.4	*45.3*
77.2	*84.0*	15.43	1,500	......	7.7	14.0	......	*52.7*	3.6	4.05	*88.9*	5.3	2.6	*49.1*
77.2	*84.7*	15.47	1,480	......	7.6	13.7	......	*55.5*	3.6	4.1	*87.8*	5.5	2.4	*43.6*
77.3	*88.4*	15.77	1,590	......	7.5	14.3	......	*52.4*	3.7	3.95	*93.7*	5.5	2.5	*45.4*
77.4	*80.4*	16.17	1,730	......	8.3	15.0	......	*55.3*	3.9	4.35	*89.7*	5.8	2.6	*44.8*
77.4	*83.6*	15.60	1,620	......	7.6	13.9	......	*54.7*	3.9	3.85	*101.3*	5.5	2.2	*40*
77.5	*86.7*	15.43	1,725	......	7.9	13.1	......	*60.3*	3.95	4.25	*93*	5.2	2.4	*46.2*
77.6	*83.6*	15.03	1,380	......	7.7	13.6	......	*56.6*	3.35	3.8	*88.2*	5.7	2.5	*43.9*
77.6	......	......	......	......	8.0	14.3	......	*55.9*	3.65	3.9	*93.6*	5.5	2.6	*47.3*
77.6	*84.9*	15.43	1,340	......	7.4	13.7	......	*54.0*	3.8	4.1	*92.7*	5.2	2.4	*46.2*
77.7	*87.4*	16.00	1,620	13.4	8.2	15.2	*88.2*	*54*	3.85	4.15	*92.8*	6.1	2.4	*39.3*
77.7	*84.4*	15.50	1,475	13.0	8.4	14.2	*91.6*	*59.2*	3.6	4.0	*90*	6.0	2.1	*35*
77.7	*80.2*	15.60	1,535	......	7.6	14.0	......	*54.3*	3.7	4.2	*88.1*	5.5	2.7	*49.1*
77.8	*82.7*	15.50	1,480	......	8.2	15.1	......	*54.3*	4.0	4.2	*95.2*	5.9	2.6	*44.1*
77.8	*86.4*	15.70	1,630	12.1	7.5	14.1	*85.8*	*53.2*	3.6	3.9	*92.3*	5.4	2.5	*46.3*
77.9	......	......	......	......	7.5	14.0	......	*53.6*	3.75	4.3	*87.2*	5.4	2.6	*48.2*
78	*82.5*	14.83	1,360	......	7.4	14.7	......	*50.3*	3.8	4.15	*91.6*	5.3	2.7	*50.9*
78	*84*	15.33	1,550	......	7.6	14.1	......	*53.9*	3.65	4.1	*89.0*	5.6	2.4	*42.9*
78	*81.6*	15.53	1,540	11.7	7.4	13.9	*84.2*	*53.2*	3.3	3.9	*84.6*	5.4	2.1	*38.9*
78.1	*83.4*	15.40	1,590	......	......	14.3	......	......	4.05	4.18	*96.9*	5.5	2.3	*41.8*
78.1	......	......	......	......	......	......	......	......	......	......	......	......	......	......

Eskimo, St. Lawrence Island, crania—Continued.

MALE—Continued.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
279,579		North coast	Adult		18.4	14.4	13.8
242,796		do	do		18.0	14.1	14.0
279,395		do	do		18.1	14.2	13.7
279,523		do	do		18.1	14.2	13.8
279,583		do	do		18.1	14.2	13.8
279,404		do	do		17.7	13.9	12.8
228,282		do	do		18.6	14.6	13.0
279,509		do	do		18.2	14.3	14.1
279,402		do	do		18.2	14.3	13.5
279,467		do	do		18.8	14.8	12.9
242,824		do	do		18.8	14.8	15.1
279,516		do	do		18.4	14.5	13.0
242,825		do	do		18.9	14.9	13.5
279,522		do	do		18.4	14.5	13.5
279,480		do	do		18.0	14.2	13.3
279,475		do	do		18.0	14.2	13.5
279,502		do	do		18.0	14.2	13.6
279,407		do	do		18.0	14.2	12.9
279,657		do	do		17.5	13.8	13.7
279,466		do	do		18.7	14.8	14.8
242,788		do	do		17.2	13.6	13.8
279,514		do	do		17.9	14.2	
242,789		do	do		18.4	14.6	14.1
241,896		do	do		18.4	14.6	13.4
279,391		do	do		17.5	13.9	13.0
242,797		do	do		18.4	14.6	13.8
279,477		do	do		18.4	14.6	13.7
279,433		do	do		18.0	14.3	13.2
242,778		do	do		18.6	14.8	13.6
242,488		do	do		17.6	14.0	14.0
242,800		do	do		18.1	14.4	14.4
243,990		do	do		18.3	14.6	14.5
279,405		do	do		17.4	13.9	13.6
279,553		do	do		17.9	14.3	13.4
241,893		do	do		19.0	15.2	13.7
279,518		do	do		17.6	14.1	13.5
279,503		do	do		18.2	14.6	14.0
279,411		do	do		18.4	14.8	13.7
243,989		do	do		17.4	14.0	13.9
279,438		do	do		18.0	14.5	13.0
279,483		do	do	Slight asymmetry.	17.5	14.1	13.4
279,525		do	do		18.6	15.0	14.0
279,663		do	do		18.6	15.0	13.6
279,389		do	do		17.6	14.2	13.5
279,513		do	do		17.7	14.3	12.9
242,771		do	do		17.8	14.4	14.5
242,777		do	do		18.0	14.6	14.4
279,554		do	do	Very slight asymmetry	18.5	15.1	13.9
279,435		do	do		17.9	14.7	12.9
279,400		do	do		18.0	14.8	13.7
279,454		do	do	Very slight asymmetry.	18.3	15.3	14.0
279,481		do	do		18.2		13.2
279,379		do	do				
279,408		do	do		18.6		
					(158)	(157)	(143)
Total		do	do		2,907.8	2,219.3	1,959.5
Average		do	do		*18.40*	*14.14*	*13.70*

Eskimo, St. Lawrence Island, crania—Continued.

MALE—Continued.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
78.3	84.2	15.53	1,465	12.4	7.9	14.6	84.9	54.1	3.6	3.95	91.2	5.8	2.6	44.8
78.3	91	15.57	1,560	......	7.4	13.5	....	54.8	3.85	4.1	93.9	5.5	2.3	41.8
78.4	84.8	15.33	1,535	......	7.3	14.2	....	51.4	3.75	4.15	90.4	5.4	2.3	42.6
78.4	85.4	15.37	1,520	......	8.6	14.0	....	61.4	3.52	3.75	93.9	5.9	2.6	44.1
78.4	85.4	15.37	1,530	11.1	7.2	13.9	79.9	51.8	3.6	3.9	92.3	5.5	2.4	43.6
78.5	81.0	14.80	....	......	7.2	13.4	....	53.7	3.5	3.85	90.9	5.4	2.4	44.4
78.5	78.3	15.40	1,550	......	7.6	14.3	....	52.1	3.45	3.9	88.5	5.7	2.4	42.1
78.6	86.8	15.53	1,570	......	7.4	14.1	....	52.5	3.6	4.1	87.8	5.8	2.4	41.4
78.6	83.6	15.33	....	......	7.5	13.6	....	55.2	3.55	3.9	91.0	5.3	2.4	45.3
78.7	76.8	15.50	1,540	......	7.7	14.6	....	52.7	3.7	4.3	86.0	5.4	2.4	44.4
78.7	89.9	16.23	1,690	......	8.2	14.3	....	57.3	3.85	4.0	96.2	6.3	2.5	39.7
78.8	79.0	15.30	....	......	7.6	13.7	....	55.5	......	......	....	......	2.4	......
78.8	79.9	15.77	1,615	......	7.5	14.2	....	52.8	3.8	4.05	93.8	5.5	2.3	41.8
78.8	82.1	15.47	1,470	......	7.3	14.4	....	50.7	3.8	4.0	95	5.3	2.5	47.2
78.9	82.6	15.17	1,410	......	7.1	14.1	....	50.4	3.8	4.1	92.7	5.5	2.2	40
78.9	83.8	15.23	....	......	7.7	14.6	....	52.7	......	......	....	5.8	2.6	44.8
78.9	84.5	15.27	1,530	......	....	14.6	....	....	3.9	4.35	89.7	5.6	2.4	42.9
78.9	80.1	15.03	1,490	......	7.9	14.7	....	53.7	3.65	4.0	91.2	5.6	2.8	50
78.9	87.5	15.00	1,320	......	7.4	13.6	....	54.4	3.6	3.9	92.3	5.6	2.6	46.4
79.1	88.4	16.10	1,640	......	....	13.8	....	....	......	......	....	......	2.7	......
79.1	89.6	14.87	1,480	12.3	7.6	13.7	89.8	55.5	3.5	3.85	90.9	5.3	2.6	49.1
79.3	......	......	....	......	....	14.2	....	....	......	......	....	......	......	......
79.4	85.4	15.67	1,590	......	7.6	13.8	....	55.1	3.5	3.85	90.9	5.5	2.5	45.4
79.4	81.2	15.47	1,400	......	7.1	14.4	....	49.3	3.55	3.95	89.9	5.2	2.4	46.2
79.4	82.8	14.80	1,350	......	7.8	13.4	....	58.2	3.8	4.2	90.5	5.3	2.4	45.3
79.4	83.6	15.60	1,620	......	7.8	14.2	....	54.9	3.7	3.9	94.9	5.2	2.0	38.5
79.4	83.0	15.57	1,565	......	7.4	14.5	....	51.0	3.65	4.05	90.1	5.7	2.6	45.6
79.4	81.7	15.17	1,500	......	7.7	13.8	....	55.8	3.8	4.25	89.4	5.4	2.6	48.2
79.6	81.4	15.67	1,570	......	....	14.3	....	....	3.65	4.15	88	5.2	2.4	46.2
79.6	88.6	15.20	1,480	12.5	7.8	14.2	88.0	54.9	3.8	4.2	90.5	5.7	2.5	43.9
79.6	88.6	15.63	1,640	......	7.4	14.2	....	52.1	3.9	4.0	97.5	5.2	2.2	42.3
79.8	88.1	15.80	1,615	......	8.1	14.7	....	55.1	3.6	4.0	90	5.8	2.5	43.1
79.9	88.9	14.97	1,325	......	7.7	13.7	....	56.2	3.6	4.0	90	5.4	2.5	46.3
79.9	83.2	15.20	1,450	12.3	7.7	14.0	87.9	55	3.75	4.0	93.8	5.4	2.5	46.3
80	80.1	15.97	1,700	......	8.2	14.5	....	56.6	3.85	4.05	95.1	6.0	2.8	46.7
80.1	84.2	15.07	1,415	......	7.5	13.3	....	56.4	3.6	3.9	92.3	5.6	2.5	44.6
80.2	85.4	15.60	1,600	......	7.5	13.9	....	54	3.5	3.8	92.1	5.4	2.5	46.3
80.4	82.5	15.63	1,500	......	7.7	14.5	....	53.1	3.75	4.2	89.3	5.5	2.35	42.7
80.5	88.5	15.10	1,400	12.1	7.4	14.5	....	51.0	3.4	3.9	87.2	5.4	2.6	48.2
80.6	80	15.17	1,395	......	7.0	14.9	....	51.0	3.5	4.0	87.5	5.4	2.5	46.3
80.6	84.8	15.00	1,415	......	7.5	14.2	....	52.8	3.5	4.0	87.5	5.4	2.6	48.2
80.6	83.3	15.87	1,550	......	7.5	14.1	....	53.2	3.7	4.15	89.2	5.4	2.5	46.3
80.6	81	15.73	1,605	......	7.9	14.4	....	54.9	3.65	3.95	92.4	5.3	2.4	45.3
80.7	84.9	15.10	1,430	......	7.1	14.0	....	50.7	3.5	4.0	87.5	5.3	2.4	45.3
80.8	80.6	14.97	1,400	......	7.7	14.7	....	52.4	3.7	4.0	92.5	5.4	2.5	46.3
80.9	90.1	15.57	1,590	......	7.3	14.1	....	51.2	3.65	4.0	91.2	5.4	2.4	44.4
81.1	88.3	15.67	1,600	12.1	7.5	13.9	....	54	3.6	3.95	91.2	5.6	2.1	37.5
81.6	89.7	15.87	1,740	......	7.9	13.9	....	56.8	3.65	4.1	89.0	5.9	2.2	37.3
82.1	79.1	15.17	1,430	......	8.3	14.4	....	57.6	3.55	3.85	92.2	5.3	2.2	41.5
82.2	83.5	15.50	1,530	......	7.6	14.9	....	51.0	3.6	4.3	83.7	5.5	2.5	45.4
83.6	88.3	15.87	1,590	......	7.2	14.3	....	50.3	3.6	4.2	85.7	5.0	2.2	44
......	......	......	....	......	8.0	14.2	....	56.3	3.65	4.1	89.0	5.4	2.3	42.6
......	......	......	....	......	7.2	14.0	....	51.4	......	......	....	5.3	2.5	47.2
......	......	......	....	......	....	....	....	....	......	......	....	......	......	......
(157)	(143)	(143)	(129)	(24)	(144)	(151)	(24)	(140)	(148)	(148)	(148)	(150)	(153)	(150)
......	......	......	194,295	304.8	1,103.7	2,125.8	....	....	545.9	597.93	....	831	378	......
76.9	84.2	15.42	1,506	12.7	7.66	14.08	90.2	54.5	3.69	4.04	91.3	5.54	2.47	44.6

Eskimo, St. Lawrence Island, crania—Continued.

FEMALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
279,403					18.1	13.1	12.7
279,417					18.2	13.4	13.9
279,528					17.9	13.2	12.7
279,484					18.4	13.6	12.7
279,561					17.3	12.8	12.8
279,504					18.2	13.5	13.2
242,798					17.8	13.2	13.2
279,586					18.2	13.5	13.2
242,795					17.9	13.3	12.7
279,441					18.0	13.4	13.4
242,819					17.7	13.2	13.6
279,567					17.4	13.0	13.4
241,884					18.2	13.6	12.8
279,552					17.9	13.4	13.5
279,558					18.4	13.8	13.0
242,810					18.4	13.8	12.8
279,506					18.1	13.6	13.3
279,482					17.7	13.3	12.7
279,576					17.7	13.3	12.7
279,469					17.8	13.4	13.1
279,499					17.5	13.2	13.5
242,762					17.5	13.2	12.7
241,882					18.0	13.6	13.5
279,430					17.3	13.1	12.4
279,412					17.7	13.4	13.8
279,570					17.7	13.4	13.3
279,532					18.1	13.7	12.9
279,378					18.2	13.8	13.3
279,564					17.4	13.2	12.5
279,420					17.6	13.4	13.6
241,888					17.7	13.5	13.5
279,463					17.8	13.6	13.8
279,380					17.9	13.7	13.6
279,386					17.2	13.2	12.8
279,461					18.0	13.8	13.2
279,588					17.6	13.5	13.0
242,827					18.2	14.0	13.1
279,384					17.8	13.7	12.9
242,775					17.5	13.5	13.4
279,437					17.7	13.7	13.3
279,531					17.8	13.8	13.1
242,836				Very slight asymmetry.	17.4	13.5	13.0
242,820					17.9	13.9	13.6
279,449					17.2	13.4	......
279,460					17.3	13.5	......
279,399					17.6	13.8	13.2
242,773					17.6	13.8	13.7
279,658					17.6	13.8	13.4
279,587					17.6	13.8	12.9
279,444					17.6	13.8	13.6
279,376					18.2	14.3	13.7
279,574					17.3	13.6	12.9
228,277					16.8	13.2	12.2
279,512					17.4	13.7	12.6
279,415					17.4	13.7	13.0
279,429					17.5	13.8	13.3
279,422					17.5	13.8	12.5
279,457					18.5	14.6	13.4
279,660					17.6	13.9	13.2
279,414					17.2	13.6	14.1
228,288					18.2	14.4	13.6
279,428					17.3	13.7	13.8
242,766					17.8	14.1	13.6
279,427					16.6	13.2	13.0
242,774					17.2	13.7	13.6
242,792					17.6	14.0	13.9
242,804				Very slight asymmetry.	18.1	14.4	13.8
279,401					17.6	14.0	13.4
279,413					17.6	14.0	13.0

Eskimo, St. Lawrence Island, crania—Continued.

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
72.4	81.4	14.63	......	......	6.9	12.4	......	55.6	3.85	4.0	93.8	5.3	2.3	43.4
73.6	88	15.17	1,325	......	7.0	12.9	......	54.3	3.4	3.95	86.1	5.1	2.5	49
73.7	81.7	14.60	1,195	......	7.2	13.5	......	53.3	3.65	3.9	93.6	5.3	2.05	38.7
73.9	79.4	14.90	1,420	......	7.3	13.4	......	54.5	3.8	4.1	92.7	5.3	2.3	43.4
74	84.8	14.30	1,210	......	6.9	12.6	......	54.8	3.78	3.8	99.5	5.1	2.3	45.1
74.2	83.3	14.97	1,355	......	7.0	13.1	......	53.4	3.6	4.2	85.7	5.1	2.3	45.1
74.2	85.2	14.73	1,365	......	7.2	13.4	......	53.7	3.5	3.9	89.7	5.0	2.6	52
74.3	83.3	15.30	1,330	11.1	7.2	12.9	86.0	55.8	3.65	3.9	93.6	5.4	2.5	46.3
74.3	81.4	14.63	1,260	......	6.7	12.8	......	52.3	3.4	3.9	87.2	5.3	2.4	45.3
74.4	85.4	14.93	1,370	......	7.2	13.2	......	54.5	3.65	3.95	92.4	5.1	2.4	47.1
74.6	88.0	14.83	1,330	......	6.7	13.0	......	51.5	3.4	3.95	86.1	5.0	2.5	50
74.7	88.2	14.60	1,280	11.5	7.1	13.0	88.5	54.6	3.8	4.0	95.0	5.3	2.2	41.5
74.7	80.5	14.87	1,400	......	6.6	12.6	......	52.4	3.45	3.85	89.6	4.8	2.4	50
74.9	86.2	14.93	......	......	7.1	12.9	......	55.0	3.7	3.8	97.4	5.1	2.6	51
75	80.8	15.07	1,490	......	7.6	13.2	......	57.6	3.5	3.85	90.9	5.4	2.4	44.4
75	79.5	15.00	1,335	......	7.7	13.8	......	55.8	3.45	3.85	89.6	5.5	2.45	45.4
75.1	83.9	15.00	1,420	......	......	......	......	......	3.5	3.95	88.6	5.0	2.4	48
75.1	81.9	14.57	......	......	6.8	12.6	......	54	3.65	3.9	93.6	4.9	2.3	46.9
75.1	81.9	14.57	1,320	11.5	7.3	12.9	89.2	56.6	3.4	3.75	90.7	5.4	2.5	46.3
75.3	84	14.77	......	......	6.5	......	......	......	3.7	4.0	92.5	4.8	2.6	54.2
75.4	88	14.73	......	......	......	......	......	......	......	......	......	......	......	......
75.4	82.7	14.47	1,320	......	6.6	13.0	......	50.8	3.7	3.8	97.4	5.0	2.4	48
75.6	85.4	15.03	1,420	11.4	7.1	13.6	83.8	52.2	3.65	4.05	90.1	5.2	2.5	48.1
75.7	81.6	14.27	1,160	......	7.1	13.2	......	53.8	3.65	4.0	91.2	5.2	2.5	48.1
75.7	88.7	14.97	1,380	......	7.3	13.6	......	53.7	3.75	4.0	93.8	5.6	2.4	42.9
75.7	85.5	14.80	......	10.9	6.9	13.1	83.2	52.7	......	......	......	5.0	2.5	50
75.7	81.1	14.90	1,350	......	6.7	13.3	......	50.4	3.4	4.0	85	4.8	2.2	45.8
75.8	83.1	15.10	1,415	......	7.3	13.7	......	53.3	3.6	4.2	85.7	5.2	2.5	48.1
75.9	81.7	14.37	1,340	......	6.4	12.6	......	50.8	3.5	3.7	94.6	5.0	2.4	48
76.1	87.7	14.87	......	......	7.6	......	......	......	......	......	......	5.5	2.4	43.6
76.3	86.5	14.90	1,370	11.4	6.9	13.4	85.1	51.5	3.85	3.8	101.3	4.8	2.25	46.9
76.4	87.9	15.07	1,250	......	7.5	13.3	......	56.4	3.65	3.9	93.6	5.2	2.6	50
76.5	86.1	15.07	......	......	7.4	13.3	......	55.6	3.8	3.85	98.7	5.2	2.3	44.2
76.7	84.2	14.40	......	......	6.7	12.6	......	53.2	3.8	3.75	101.4	5.1	2.3	45.1
76.7	83.0	15.00	1,370	......	7.1	13.2	......	53.8	3.8	3.8	100	5.1	2.3	45.1
76.7	83.6	14.70	1,300	......	7.2	12.8	......	56.2	3.3	3.7	89.2	5.2	2.4	46.2
76.9	81.4	15.10	1,425	11.9	7.6	13.2	90.2	57.6	3.65	3.85	94.8	5.6	2.2	39.3
77	81.9	14.80	......	......	7.1	13.4	......	53	3.55	4.15	85.6	5.5	2.5	45.4
77.1	86.4	14.80	1,365	11.2	6.7	13.0	86.2	51.5	3.45	3.85	89.9	4.7	1.9	40.4
77.4	84.7	14.90	1,375	......	......	......	......	......	3.6	3.8	94.7	4.9	2.3	46.9
77.5	82.9	14.90	......	......	7.0	13.0	......	53.8	3.55	3.88	91.5	4.8	2.5	51
77.6	84.1	14.63	1,250	......	7.1	13.7	......	52.6	3.7	3.95	93.7	5.4	2.6	48.2
77.6	85.5	15 13	1,360	......	6.6	13.4	......	49.2	3.4	3.95	86.1	5.0	2.4	48
77.9	......	......	......	......	......	......	......	......	......	......	......	......	......	......
78	......	......	......	......	7.1	......	......	......	3.65	3.95	92.4	5.1	2.4	47.1
78.4	84.1	14.87	1,375	......	7.1	13.6	......	52.2	3.75	4.15	90.4	4.8	2.4	50
78.4	87.3	15.03	1,405	......	7.1	13.3	......	53.4	3.3	3.7	89.2	5.0	2.4	48
78.4	85.4	14.93	1,500	......	7.3	13.1	......	55.7	3.5	3.95	88.6	5.3	2.4	45.3
78.4	82.3	14.77	1,430	......	7.1	13.1	......	54.2	3.55	4.0	88.8	5.1	2.2	43.1
78.4	86.6	15.00	1,450	......	7.4	14.3	......	51.8	3.6	3.9	92.3	5.6	2.5	44.6
78.6	84.3	15.40	1,485	......	7.7	13.8	......	55.8	3.8	3.95	96.2	5.5	2.5	45.4
78.6	83.5	14.60	1,300	......	......	......	......	......	......	......	......	......	......	......
78.6	78.7	14.07	1,190	......	6.4	12.3	......	52.0	3.5	3.45	101.4	4.9	2.3	46.9
78.7	81.0	14.57	1,320	......	7.4	13.0	......	56.9	3.6	4.0	90	5.1	2.3	45.1
78.7	83.6	14.70	......	......	7.0	13.2	......	53.0	......	......	......	5.2	2.4	46.2
78.9	85	14.87	1,350	......	7.1	12.8	......	55.5	3.3	3.9	84.6	5.0	2.3	46
78.9	79.9	14.60	......	......	7.5	13.7	......	54.7	3.7	4.18	88.5	5.1	2.4	47.1
78.9	81	15.50	1,590	......	7.1	13.9	......	51.1	3.85	3.9	98.7	5.0	2.4	48
79	83.8	14.90	1,320	......	......	13.3	......	......	3.55	3.9	91.0	5.3	2.2	41.5
79.1	91.6	14.77	1,420	......	7.1	12.7	......	55.9	3.5	3.95	88.6	5.2	2.4	46.2
79.1	83.4	15.40	1,450	......	6.9	13.5	......	51.1	3.75	4.0	93.8	4.9	2.45	50
79.2	89.0	14.93	1,305	......	7.2	12.7	......	56.7	3.6	3.85	93.5	4.9	2.2	44.9
79.2	85.3	15.17	1,350	10.7	6.9	13.0	82.3	53.1	3.5	3.9	89.7	4.75	2.5	52.6
79.5	87.2	14.27	......	......	7.1	13.4	......	53	......	......	......	5.3	2.6	49.1
79.6	88.0	14.83	1,290	12.5	7.5	13.3	94	56.4	3.7	3.8	97.4	5.5	2.35	42.7
79.6	88	15.17	1,570	......	6.9	13.9	......	49.6	4.0	3.9	102.6	5.4	2.3	42.6
79.6	84.9	15.43	1,450	......	7.3	13.0	......	56.2	3.7	4.15	89.2	5.0	2.5	50
79.6	84.8	15.00	1,380	......	7.0	13.0	......	53.8	3.5	3.8	94.7	5.0	2.4	48
79.6	88.3	14.87	1,450	......	7.2	13.2	......	54.6	3.7	4.0	92.5	5.2	2.2	42.3

Eskimo, St. Lawrence Island, crania—Continued.

FEMALE—Continued.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
279,426					17.6	14.0	12.9
279,431					17.6	14.0	......
279,526					18.1	14.4	13.9
279,440					18.2	14.5	......
279,540					17.8	14.2	13.9
242,945				Probably mixed Indian.	(16.9)	(13.5)	(13.2)
279,538					17.0	13.6	13.2
279,424				Very slight asymmetry.	17.0	13.6	12.1
279,390					16.2	13.0	12.6
242,787				Very slight asymmetry.	16.7	13.4	13.3
279,472					17.7	14.2	13.4
279,667					16.2	13.0	13.2
279,468					17.6	14.2	......
279,398					17.8	14.0	13.6
242,818				Very slight occipital flattening.	17.4	14.1	13.6
241,892					17.0	13.8	13.3
279,393					17.0	13.8	13.6
241,894					17.2	14.0	12.6
279,557				Moderate asymmetry.	(18.2)	(14.9)	(12.6)
228,284				Moderate occipital compression.	(16.6)	(14.2)	(13.2)
279,383					......	......	......
279,418					......	......	......
279,542					17.1	......	12.8
					(87)	(86)	(82)
Total					1,533.4	1,174.2	1,082.6
Average					*17.63*	*13.65*	*13.20*

Eskimo, St. Lawrence Island, crania—Continued.

FEMALE—Continued.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c.c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
79.6	*81.6*	14.83	1,400	......	....	12.9	....	....	3.5	3.8	*98.1*	5.0	2.5	*50*
79.6	......	......	......	......	....	....	....	....	......	......	......	......	......	......
79.6	*85.5*	15.47	1,400	......	7.0	....	....	....	3.6	4.1	*87.8*	5.1	2.7	*52.9*
79.7	......	......	......	......	6.7	13.7	....	*48.9*	3.55	4.0	*88.8*	5.0	2.6	*52*
79.8	*84.2*	15.30	1,450	......	7.1	13.4	....	*53*	3.6	4.2	*85.7*	5.3	2.4	*45.3*
(*79.9*)	(*86.8*)	(14.53)	(1,335)	......	(6.8)	(12.8)	....	(*53.1*)	(3.4)	(3.8)	(*89.5*)	(5.0)	(2.5)	(*50*)
80	*86.8*	14.60	1,280	......	....	12.9	....	....	......	......	......	......	......	......
80	*79.6*	14.23	1,305	......	7.0	12.8	....	*54.7*	3.5	3.8	*94.7*	5.3	2.5	*47.2*
80.2	*86.3*	13.98	1,120	......	7.1	13.1	....	*54.2*	3.4	3.9	*87.2*	5.0	2.5	*50*
80.2	*88.4*	14.47	1,330	......	6.9	12.6	....	*54.8*	3.3	3.8	*86.8*	4.8	2.6	*54.2*
80.2	*84.0*	15.10	1,410	......	7.4	13.6	....	*54.9*	3.6	4.2	*87.8*	5.0	2.4	*48*
80.2	*90.4*	14.13	1,230	......	6.2	13.1	....	*47.3*	3.6	3.9	*92.3*	4.6	2.4	*52.2*
80.7	......	......	......	......	6.8	13.3	....	*51.1*	......	......	......	5.0	2.5	*50*
80.9	*86.9*	14.97	1,530	......	7.4	14.0	....	*52.9*	3.5	3.95	*88.6*	5.1	2.4	*47.1*
81	*86.4*	15.03	1,380	10.8	6.6	13.3	*81.2*	*49.6*	3.6	3.95	*91.2*	4.7	2.5	*53.2*
81.2	*86.4*	14.70	1,350	......	7.2	12.8	....	*56.2*	3.65	3.9	*93.6*	5.1	2.3	*45.1*
81.2	*88.3*	14.80	1,340	11.5	7.0	13.2	*87.1*	*53.0*	3.7	3.9	*94.9*	5.3	2.4	*45.3*
81.4	*80.8*	14.60	1,390	......	7.2	13.8	....	*52.2*	3.6	3.95	*91.2*	5.1	2.3	*45.1*
......	......	15.23	1,500	......	6.9	....	....	....	3.5	4.05	*86.4*	5.0	2.5	*50*
......	......	14.67	1,390	......	6.9	13.7	....	*50.4*	3.65	3.75	*97.3*	5.0	2.0	*40*
......	......	......	......	......	6.5	13.9	....	*46.8*	3.8	4.0	*95*	5.0	2.2	*44*
......	......	......	......	......	7.0	....	....	....	3.6	3.95	*91.2*	5.3	2.65	*50*
......	......	......	......	......	7.0	....	....	....	3.8	4.0	*95*	5.4	2.5	*46.3*
(*86*)	(*81*)	(81)	(69)	(12)	(82)	(78)	(*12*)	(*75*)	(81)	(81)	(*81*)	(86)	(86)	(*86*)
......	......	......	94,090	136.4	578.8	1,029.8	....	....	291.83	317.86	....	440.45	206.2	....
77.4	*84.9*	*14.77*	*1,364*	*11.37*	*7.06*	*13.20*	*86.4*	*53.4*	*3.60*	*3.92*	*91.8*	*5.12*	*2.40*	*46.8*

Eskimo crania: Summary of measurements.

MALE.

	Greenland.	Baffin Land.	"Central."	Smith Sound.	Alaska.	St. Lawrence Island.	Asiatic.
Number of skulls	(39)	(4)	(10)	(7)	(27)	(158)	(5)
Vault:							
Length	19.05	18.45	18.98	18.96	18.29	18.40	18.62
Breadth	13.59	13.62	14	14.37	13.90	14.14	14.67
Height	13.95	13.80	13.97	14.06	13.76	13.70	13.36
Cranial Index	*71.5*	*73.8*	*73.8*	*75.8*	*76*	*76.9*	*79.1*
Mean Height Index	*85.5*	*86*	*84.7*	*84.4*	*85.5*	*84.2*	*81*
Module	15.54	15.29	15.65	15.81	15.32	15.42	15.56
Capacity	1,560	1,482	1,563	1,566	1,466	1,506	1,552
Face:							
M.-N. Heights	12.18	11.90	12.66	12.13	12.80	12.70	....
Alv. Pt.-N. Heights	7.40	7.35	7.70	7.64	7.53	7.66	7.6
Breadth	14	13.95	14.48	14.70	14.10	14.08	13.96
Facial Index, total	*82.7*	*85.2*	*87.2*	*82.4*	*91.9*	*90.2*	*(85.6)*
Facial Index, upper	*53.6*	*52.7*	*53*	*52*	*53.7*	*54.5*	*54.9*
Orbits:							
Mean height	3.68	3.50	3.69	3.54	3.65	3.69	3.59
Mean breadth	4.01	3.87	4.09	4.11	4.02	4.04	4.01
Mean Index	*91.8*	*90.3*	*90.3*	*86.7*	*92.9*	*91.3*	*89.5*
Nose:							
Height	5.33	5.22	5.43	5.73	5.42	5.54	5.62
Breadth	2.29	2.17	2.31	2.27	2.32	2.47	2.36
Index	*42.9*	*41.6*	*42.6*	*39.7*	*45.8*	*44.6*	*42*

FEMALE.

	Greenland.	Baffin Land.	"Central."	Smith Sound.	Alaska.	St. Lawrence Island.	Asiatic.
Number of skulls	(44)	(5)	(6)	(2)	(18)	(87)	....
Vault:							
Length	17.99	18.44	18.17	18	17.68	17.63	....
Breadth	12.96	13.22	13.70	13.80	13.57	13.65	....
Height	13.10	13.32	13.69	13.65	13.19	13.20	....
Cranial Index	*71.9*	*72*	*75.4*	*76.7*	*76.8*	*77.4*	....
Mean Height Index	*84.8*	*84*	*85.9*	*85.8*	*84.4*	*84.9*	....
Module	14.71	14.96	15.18	15.14	14.81	14.77	....
Capacity	1,347	1,403	1,443	....	1,346	1,364	....
Face:							
M.-N. Heights	11.33	11.30	11.70	11.20	10.95	11.37	....
Alv. Pt.-N. Heights	6.88	6.80	7.14	6.80	7	7.03	....
Breadth	12.90	13.05	13.82	13.20	13.10	13.20	....
Facial Index, total	*83.1*	*87.3*	*84.8*	*84.8*	*88.4*	*86.4*	....
Facial Index, upper	*53.8*	*52.5*	*51.7*	*51.5*	*53.7*	*53.4*	....
Orbits:							
Mean height	3.56	3.50	3.64	3.51	3.59	3.60	....
Mean breadth	3.88	3.90	4.05	3.96	3.86	3.92	....
Mean Index	*91.8*	*89.7*	*86.6*	*88.6*	*92.8*	*91.8*	....
Nose:							
Height	5	5.06	5.06	5.3	5.12	5.12	....
Breadth	2.15	2.22	2.21	2.3	2.28	2.40	....
Index	*43.2*	*43.9*	*43.7*	*43.9*	*44.6*	*46.8*	....

NOTES ON THE ESKIMO.

The 412 (250 males, 162 females) Eskimo crania whose principal measurements are here recorded give a number of indications of importance which may briefly be stated as follows:

1. There is a strong general relationship in measurements (as there is in visual characteristics) in the crania of all the Eskimo. The term "Eskimo type" is as well justified for the skull as it is for the living of these people.

2. The cranial breadth and with it the cranial index decrease gradually from the west to the east. There is no sudden change at

any geographical point; and as there has also been no known or even suspected coming in at any point of other people who would have admixed and modified the Eskimo, the gradual change in head form may be regarded as having taken place within the tribes themselves, and is probably connected with environment conditions—using the term "environment" in its broadest sense.

3. The height of the skull decreases from the Central Eskimo toward the west in the males, but not in the females—which appears conservative on one hand of the unity of, and on the other of the changes within, the stock.

4. There is a remarkable agreement among all the Eskimo in measurements relating to the size of the skull. Where differences exist they are probably due in the main to insufficient number of specimens.

5. The face, especially the portion above the teeth, is high and also broad. The indices, especially the upper facial, are lowest in the Smith Sound, highest in the western groups.

6. The orbits are on the average fairly uniform.

7. The nose, characteristically narrow throughout, is especially so in the eastern, least so in the western, Eskimo.

8. The Alaska Eskimo, while well within the general type, show relatively the highest face and orbits.

9. There is a plain connection of the stock with the Bering Sea and the Asiatic Eskimo; and through these with the mongoloid type of northeastern and northern Asia. As we proceed eastward there is in general an increase in the length and height, with corresponding decrease in the breadth of the vault, and a decrease in the breadth of the nasal aperture; all of which are in all probability changes of adaptation to environmental conditions, and especially connected with the use and development of the muscles of mastication.

ALASKA AND RELATED INDIANS.

Aleut crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
242,875	Var	Atka Island	Adult		18.9	14.4	13.4
'943		Chernoffsky Island	do		18.8	14.4	12.4
'849		Kodiak Island	do		18.2	14	13
'924		Chernoffsky	do		18.4	14.7	13
'908		Amanak	do		18.5	14.8	12.1
'977		Atka	do		18.6	14.9	12.5
'848		Unalaska	do		18.3	14.7	13
'863		Adakh	do		18	14.5	12.4
'930		Chernoffsky	do		17.8	14.5	12.6
225,266		"Aleutian Islands"	do		17.6	14.4	12.7
242,880		Chernoffsky	do		18.4	15.1	13.3
'868		Constantine Harbor.	do		18.6	15.3	12.2
'940		Chernoffsky	do		18.9	15.6	12.8
'882		do	do		18.4	15.2	12.9
'869		Atka	do		18	15	13.2
'909		do	do		18.4	15.4	13.5
17,479		Kagamil Islands	do		18.2	15.3	13
242,871		Unga	do		18.2	15.4	12.3
'910		do	do		18.2	15.4	12.6
'922		Chernoffsky	do		18.2	15.4	12.8
'900		Kagamil Islands	do		18.6	15.8	12.2
'872		Atka	do		18.1	15.4	......
'915		Chernoffsky	do		18.4	15.7	12.6
17,485		Kagamil Islands	do		18	15.4	12.9
242,912		Unga	do		17.6	15.7	12.8
					(25)	(25)	(24)
Total					457.3	376.4	306.2
Average					*18.29*	*15.06*	*12.76*

FEMALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
243,973	Var	Atka Island	Adult		17.8	14	12.8
242,861		Amanak Island	do		17.7	14	13
228,041		Kiska Island	do		17.6	14	11.8
242,870		Atka	do		17.2	13.8	12.8
279,205		Hog Island	do		17.2	14	11.8
242,866		Unga Island	do		17.4	14.2	11.9
'939		Chernoffsky Island	do		17.4	14.2	11.9
'917		do	do		18	14.7	11.8
'893		Unalaska	do		18.1	14.8	12.6
'874		Atka	do		17.6	14.4	12.3
'911		Unga	do		17.8	14.6	12.9
'914		Chernoffsky	do		17.4	14.3	12
243,974		Atka	do		17.7	14.6	13
242,853		Amanak	do		17.4	14.4	12.2
'944		Chernoffsky	do		17	14.1	11.5
'938		do	do		17.9	15	12.3
'918		do	do		17	14.3	12.5
'850		Kodiak Island	do		17.1	14.4	13
'879		Chernoffsky	do		17	14.4	12.6
243,976		Atka	do		16.8	14.3	11.5
279,204		Hog Island	do		17.4	14.8	12.2
242,886		Chernoffsky	do	Slight occipital compression.	17.2	14.8	12.6
'920		do	do		17.3	14.9	11.9
'019		do	do	Slight asymmetry.	16.9	14.6	12
279,206		Hog Island	do		17	14.7	13
242,877		Chernoffsky	do		17.4	15.1	11.8
279,203		Hog Island	do		17.2	15.2	12.3
243,972		Unga	do		17.8	15.8	12.6
					(28)	(28)	(28)
Total					487.3	406.4	343.6
Average					*17.40*	*14.51*	*12.27*

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[1] Teeth about one-half worn off.

[2] Teeth about three-fourths worn off.

ALASKA AND RELATED INDIANS.

Aleut crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
76.2	80.5	15.57	1,590	......	......	14.5	......	......	3.4	4.05	84	5.3	2.85	53.8
76.6	74.7	15.20	1,510	......	......	14.2	......	......	......	4.1	......	5.2	2.7	51.9
76.9	80.8	15.07	1,510	......	7.9	14.6	......	54.1	3.7	4.2	88.1	5.4	2.9	53.7
79.9	78.6	15.37	1,580	12.9	7.9	14.6	88.4	54.1	3.4	3.9	87.2	5.6	2.3	41.1
80	72.7	15.13	1,610	12.1	7.4	14.4	84	51.4	3.85	4.3	89.5	5.5	2.4	43.6
80.1	74.6	15.33	1,530	......	7.5	14.5	......	51.7	3.6	3.85	93.5	5	2.6	52
80.3	73.8	15.33	1,475	......	7.4	14.7	......	50.3	3.38	3.8	88.8	5.3	2.7	50.9
80.6	76.3	14.97	......	......	7.3	14.2	......	51.4	3.8	4.2	90.5	5.5	2.5	45.5
81.5	78	14.97	1,360	......	7.5	14.9	......	50.3	3.45	4.05	85.2	5.2	2.5	48.1
81.8	79.4	14.90	1,420	[1] 11.6	6.6	13.9	85.4	47.5	3.4	3.85	88.4	4.8	2.4	50
82.1	79.4	15.60	1,630	......	8.4	14.5	......	57.9	3.75	4.1	91.4	5.8	2.5	43.1
82.3	72.4	15.37	1,440	12.7	7.6	14.5	87.6	52.4	3.4	4.0	85	5.4	2.45	45.4
82.5	74.2	15.77	1,700	......	7.8	15.2	......	51.3	3.95	4.15	95.2	5.8	2.8	48.3
82.6	76.8	15.50	1,510	......	7.5	14.8	......	50.7	3.5	4.0	87.5	5.5	2.5	45.5
83.3	80	15.40	1,660	......	6.5	14.3	......	45.5	3.5	3.9	89.7	4.8	2.7	56.2
83.7	79.9	15.77	1,680	11.3	6.7	14.2	79.6	47.2	3.4	3.8	89.5	5	2.75	55
84.1	77.6	15.50	1,710	[3] 12.6	7.6	15.3	82.4	49.7	4.0	4.2	95.2	5.3	2.5	47.2
84.6	73.2	15.30	1,550	11.6	6.8	14.6	79.5	46.6	3.65	4.2	86.6	5.2	2.6	50
84.6	75	15.40	1,510	......	7.5	14.9	......	50.3	3.95	4.1	96.4	5.4	2.4	44.4
84.6	76.2	15.47	1,620	[3] 11.5	7.2	14.8	77.7	48.6	3.6	3.9	92.3	5.2	2.6	50
85	70.9	15.53	1,660	......	7.6	14.8	......	51.4	3.6	4.0	90	5.3	2.4	45.3
85.1	......	......	1,630	......	7.2	14.4	......	50	3.5	3.9	89.7	5.3	2.9	54.7
85.3	73.9	15.57	1,580	[3] 11.9	7.5	14.8	80.4	50.7	3.35	3.95	84.8	5.3	2.8	52.8
85.6	77.2	15.43	1,390	......	7.6	14.6	......	52.1	3.75	4.15	90.4	5.4	2.2	40.7
89.2	76.9	15.33	1,610	12.5	7.7	15.2	82.2	50.6	3.7	4.2	88.1	5.4	2.5	46.3
(25)	(24)	(24)	(24)	(10)	(23)	(25)	(10)	(23)	(24)	(25)	(24)	(25)	(25)	(25)
......	......	......	37,465	120.7	170.7	365.4	......	......	86.58	100.85	......	132.9	64.45	......
82.3	76.6	15.36	1,561	12.07	7.42	14.62	82.5	50.7	3.61	4.03	89.5	5.32	2.58	48.5

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
78.6	80.5	14.87	1,440	......	......	......	......	......	......	......	......	5	2.7	54
79.1	82	14.90	......	......	......	......	......	......	......	......	......	4.8	......	......
79.6	74.7	14.47	1,250	......	6.8	13	......	52.3	3.5	3.75	93.4	4.9	2.5	51
80.2	82.6	14.60	1,280	......	6.9	13.2	......	52.3	3.5	3.8	92.1	4.9	2.4	49
81.4	75.6	14.33	1,400	12.2	7.5	12.5	97.6	60	3.45	3.85	89.6	5.1	2.15	42.2
81.6	75.3	14.50	1,300	11.3	7.1	13.4	84.3	50.3	3.7	4.0	92.5	5.1	2.4	47.1
81.6	75.3	14.50	1,380	......	6.7	13.1	......	51.2	3.6	3.8	94.7	5	2.05	41
81.7	72.2	14.83	1,370	......	......	13.7	......	......	3.68	4.05	90.9	5.3	2.6	49.1
81.8	76.6	15.17	......	......	......	......	......	......	......	......	......	......	......	......
81.8	76.9	14.77	1,300	......	7	13.4	......	52.2	3.45	3.7	93.2	4.9	2.6	53.1
82	79.6	15.10	1,550	11.6	7	12.5	92.8	56	3.4	3.6	94.4	5	2.3	46
82.2	75.7	14.57	1,330	......	6.8	13.8	......	49.3	3.55	3.95	89.9	4.9	2.7	55.1
82.5	80.5	15.10	1,540	......	6.7	......	......	......	3.35	3.8	88.2	4.9	2.4	49
82.8	76.7	14.67	1,330	11.4	7	......	......	......	......	......	......	4.8	2.3	47.9
82.9	74	14.20	1,250	......	......	13.6	......	......	3.4	3.9	87.2	4.8	2.6	54.2
83.8	74.8	15.07	1,500	11.5	7.1	13.7	83.9	51.8	3.65	3.7	98.6	5.1	2.15	42.2
84.1	79.9	14.90	1,340	[4] 10.3	......	13.1	78.6	......	3.6	3.85	93.5	4.9	2.4	49
84.2	82.5	14.83	1,410	[1] 12.7	7.6	13.4	94.8	56.7	(3.9)	(3.8)	(102.6)	5.5	2.4	43.6
84.7	80.2	14.67	1,340	......	7.2	13.4	......	53.7	3.85	4.0	96.2	5	2.45	49
85.1	74	14.20	1,215	......	6.3	13.1	......	48.1	3.55	3.8	93.3	5	2.7	54
85.1	75.8	14.80	1,490	[5] 11.8	7.4	13.1	90.1	56.5	3.75	4.05	92.6	5.4	2.35	43.5
86	78.8	14.87	1,420	......	7.3	13.4	......	54.5	3.45	3.8	90.8	5.1	2.45	48
86.1	73.9	14.70	1,300	......	......	13.5	......	......	3.9	3.95	98.8	5.3	2.3	43.4
86.4	76.2	14.50	1,390	11.5	6.8	13.3	86.5	51.1	3.55	4.0	88.8	4.9	2.3	46.9
86.5	75.7	14.57	1,480	11.4	7	13.4	85.1	52.2	......	......	......	4.9	2.5	51
86.8	72.6	14.77	1,360	12.3	7.8	13.3	92.5	58.6	3.65	3.8	95.9	5.3	2.2	41.5
88.4	75.9	14.90	1,480	12.5	7.7	......	......	......	......	......	......	5	2.2	44
88.8	75	15.40	1,570	......	7.8	14.4	......	52.1	3.5	3.8	92.1	5.0	2.6	46.4
(28)	(28)	(28)	(26)	(12)	(21)	(22)	(10)	(18)	(21)	(21)	(21)	(27)	(26)	(26)
......	......	......	36,015	140.5	149.5	293.3	......	......	75.03	80.95	......	136.4	62.7	......
83.4	76.9	14.73	1,385	11.71	7.12	13.33	88.5	53.5	3.57	3.85	92.7	5.05	2.41	48

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[3] Teeth moderately worn off.

[4] Teeth about one-fourth worn off.

[5] Teeth about one-third worn off.

Alaska: Tribe unknown—Indian.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
242,925		Yukon River	Adult		18.4	13.9	13.8
'892		N. Jackson Sch.	do		18.8	14.2	13.6
'885		"Alaska"	do		18.8	14.6	12.6
243,986		do	do		18.2	14.4	12.2
225,040		Prince William Sound.	do	Slight occipital compression.	(17.6)	(14.8)	(13.7)
243,985		"Alaska"	do		17.6	14.6	12.8
242,937		Point Hope	do		18.2	15.7	13.5
					(6)	(6)	(6)
Total					110	87.4	78.5
Average					*18.33*	*14.57*	*13.08*

[1] Teeth moderately worn.

FEMALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
227,463		"Alaska"	Adult		17.7	13.5	13.5
242,926		do	do		18.4	14.6	13.2
'932		do	do		17.8	14.2	13.4
242,899		do	do		17	13.9	13.2
'901		do	do		16.7	14	11.9
'936		do	do	Marked occipital compression.	(15)	(14.8)	(13.3)
					(5)	(5)	(5)
Total					87.6	70.2	65.2
Average					*17.52*	*14.04*	*13.04*

[3] Teeth about one-third worn off.

Alaska: Tribe Tlingit.

MALE.

Catalogue No. (U. S. N. M.)	Tribe locality.	Approximate age of subject.	Deformation.	Vault.		
				L.	B.	H.
				Cm.	*Cm.*	*Cm.*
300,898	Admiralty Island	Adult		18.2	14.1	14.6
'6	Prince of Wales Island, west coast.	do		18.3	14.4	13.3
304,095	do	do		18.8	14.8	13.8
242,948	Sitka	do		[4] 19.3	15.2	14.6
'904	do	do		[1] 18.8	15	13.6
225,255	Fort Wrangel	do		18.8	15.1	12.9
242,947	do	do	Moderate occipital compression.	(17.5)	(16.2)	(13)
300,894	East Hecta Island, west of Prince of Wales Island.	do		18.7	15.4	14.2
				(7)	(7)	(7)
Total				130.9	104.0	97.0
Average				*18.7*	*14.86*	*13.86*

[1] Teeth very slightly worn.

[2] Not Eskimo-like.

[3] Teeth slightly worn.

[4] 4 mm. allowance made for a protruding process at inio

Alaska: Tribe unknown—Indian.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose B	
75.6	85.4	15.37	1,520	[1] 12.1	7.2	13.9	87	51.8	3.4	4.1	82.9	5.1	2.5	49
75.6	82.4	15.53	1,530	......	7.4	15	......	49.3	3.7	4.3	86	5.3	2.9	54.7
77.7	75.4	15.33	1,590	......	8	14.7	......	54.4	3.6	4	90	5.2	2.45	47.1
79.1	74.8	14.93	1,410	[1] 10.4	6.6	14.4	72.2	45.8	3.5	4	87.5	5.15	2.9	56.3
......	......	15.37	1,525	......	......	15	......	......	3.4	3.9	87.2	5.2	2.6	
83	79.5	15	1,365	[3] 12.6	7.9	13.8	91.3	57.2	3.9	4	97.5	5.6	2.4	42.9
86.3	79.6	15.80	1,710	......	7.4	......	......	......	3.4	3.9	87.2	5.5	2.9	52.7
(6)	(6)	(7)	(7)	(3)	(6)	(6)	(3)	(5)	(7)	(7)	(7)	(7)	(7)	(7)
......	......	......	10,650	35.1	44.5	86.8	......	......	24.9	28.2	......	37.05	18.65	......
79.5	79.5	15.33	1,521	11.7	7.42	14.47	83.3	51.7	3.56	4.03	88.3	5.29	2.66	50.3

[3] Teeth slightly worn.

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose B	
76.3	83.3	14.90	1,300	[3] 11.4	7.2	13.1	87	55	3.7	3.9	94.9	5.3	2.5	47.2
79.4	80	15.40	......	......	7.3	13.1	......	55.7	3.6	3.8	94.7	5.5	2.5	45.4
79.8	83.8	15.13	1,530	[3] 11.6	7.4	13.6	85.3	54.4	3.7	3.85	96.1	5.3	2.4	45.3
81.8	83	14.70	1,370	......	6.4	......	......	......	3.5	3.8	92.1	4.8	(2.9)	(60.4)
83.8	77.5	14.20	1,145	......	......	12.8	......	......	3.5	3.75	93.4	4.7	2.45	52.1
......	......	14.33	1,270	......	7	12.8	......	54.7	3.4	3.5	97.1	4.9	2.3	48.9
(5)	(5)	(6)	(5)	(2)	(5)	(5)	(2)	(4)	(6)	(6)	(6)	(6)	(5)	(5)
			6,615	23.0	35.3	65.4			21.4	22.6		30.5	12.15	
80.1	82.6	14.84	1,323	11.5	7.06	13.08	86.1	54.9	3.57	3.77	94.2	5.08	2.43	47.3

[4] Not negroid.

Alaska: Tribe Tlingit.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity.	Face.			*Facial Index, total.*	*Facial Index, upper.*	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
				Menton-Nasion.	Alveolar Pt.-Nasion.	Diam. Bizygomatic maxim.								
		Cm.	C. c.											
77.5	90.4	15.63	1,630	[1] 12.9	8	13.8	93.5	58	3.7	4	92.5	5.6	2.3	[2] 41.1
78.7	81.4	15.33	1,450	[3] 12.1	7.7	13.5	89.6	57	3.9	3.9	100	5.4	2.7	50
78.7	82.1	15.80	1,620	[1] 12.4	7.8	15.3	81	51	3.7	4	92.5	5.4	2.5	46.3
78.8	84.6	16.37	1,580	[5] 12.8	8	14.9	85.9	53.7	3.6	3.9	92.3	5.7	2.5	43.9
79.8	80.5	15.80	1,800	[5] 12.9	7.9	14.9	86.6	53	3.8	4.2	90.5	5.5	2.9	52.7
80.3	76.6	15.60	1,610	......	......	14.4	......	......	3.6	3.9	92.3	5.2	2.7	51.9
......	......	15.57	1,610	[6] 12.1	7.9	15.3	79.1	51.6	4	4.1	97.6	5.5	2.15	[2] 39.1
82.4	83.3	16.10	1,580	[7] 12.8	7.8	14.8	86.5	52.7	3.6	4.2	85.7	5.7	3	52.6
(7)	(7)	(8)	(8)	(7)	(7)	(7)	(7)	(7)	(8)	(8)	(8)	(8)	(8)	(8)
......	......	......	12,880	88	55.1	102.5	......	......	29.9	32.2	......	44	20.7	......
79.4	82.6	15.77	1,610	12.6	7.87	14.36	85.8	53.8	3.74	4.02	92.9	5.5	2.6	47

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[5] Teeth moderately worn.

[6] Teeth about one-half worn off.

[7] Teeth about one-third worn off.

Alaska: Tribe Tlingit—Continued.

FEMALE.

Catalogue No. (U. S. N. M.)	Tribe locality.	Approximate age of subject.	Deformation.	Vault.		
				L.	B.	H.
				Cm.	*Cm.*	*Cm.*
300,895	West coast of Prince of Wales Island.	Adult		18	14.3	12.9
262,170	Prince William Sound, Knights Island.	...do	Marked asymmetry	(17.2)	(14.3)	(12)
242,902	Ozerskoi, near Sitka	...do	Moderate frontal occipital compression.	(16.4)	(14.8)	(12)
300,897	West coast of Prince of Wales Island.	...do		17.4	14.4	12.1
Total				(2) 35.4	(2) 28.7	(2) 25
Average				*17.7*	*14.35*	*12.5*

Haida crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
304,053	E. Kirk	Queen Charlotte Islands.	Adult		17.7	14.4	13.6
'2		...do	...do		17.8	15.4	13.2
Total					(2) 35.5	(2) 29.8	(2) 26.8
Average					*17.75*	*14.9*	*13.4*

FEMALE.

304,051	E. Kirk	Queen Charlotte Islands.	Adult		17.4	14.2	13
'4			...do		16.8	13.8	12.8
Total					(2) 34.2	(2) 28	(2) 25.8
Average					*17.1*	*14*	*12.9*

Alaska: Tribe Tlingit—Continued.

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity.	Face.			*Facial Index, total.*	*Facial Index, upper.*	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
				Menton-Nasion.	Alveolar Pt.-Nasion	Diam. Bizygomatic maxim.								
		Cm.	*C. c.*											
79.4	*79.9*	15.07	1,310	[a] 11.4	6.9	13.7	*83.2*	*50.4*	3.4	4.1	*82.9*	4.85	2.3	*47.4*
......	......	14.50	1,250	....	6.6	13.4	......	*49.2*	3.4	3.7	*91.9*	5	2.3	*46*
......	......	14.40	1,340	....	....	13	......	......	3.6	3.7	*97.3*	5	2.3	*46*
82.8	*76.1*	14.63	1,450	[a] 11.7	7.3	13.2	*88.6*	*55.3*	3.8	3.8	*100*	5.3	2.5	*47.2*
(2) *81.1*	(2) *78*	(4) *14.65*	(4) 5,350 *1,338*	(2) 23.1 *11.55*	(3) 20.8 *6.93*	(3) 40.3 *13.43*	(2) *86.2*	(3) *51.6*	(4) 14.2 *3.55*	(4) 15.3 *3.82*	(4) *92.8*	(4) 20.15 *5.04*	(4) 9.4 *2.35*	(4) *46.7*

Haida crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
81.4	*84.7*	15.23	1,400	12.4	7.7	13.4	*92.5*	*57.6*	(3.97)	(3.8)	(*104.5*)	5.6	2.6	*46.4*
86.5	*79.5*	15.47	1,600	12	7	14.5	*82.8*	*48.3*	3.7	4.3	*86*	5.3	2.9	*54.7*
(2) *83.9*	(2) *82.1*	(2) *15.35*	(2) 3,000 *1,500*	(2) 24.4 *12.2*	(2) 14.7 *7.35*	(2) 27.9 *13.95*	(2) *87.5*	(2) *52.7*	....	....	....	(2) 10.9 *5.45*	(2) 5.5 *2.75*	(2) *50.6*

FEMALE.

81.6	*88.3*	14.87	1,240	......	7	13.3	....	*52.6*	3.4	3.8	*89.5*	4.7	2.3	*48.9*
82.1	*88.7*	14.47	1,130	......	6.8	13.4	....	*50.8*	3.5	3.7	*94.6*	4.9	2.2	*44.9*
(2) *81.9*	(2) *88.9*	(2) *14.67*	(2) 2,370 *1,185*	....	(2) 13.8 *6.9*	(2) 26.7 *13.35*	....	(2) *51.7*	(2) 6.9 *3.45*	(2) 7.5 *3.75*	(2) *92*	(2) 9.6 *4.8*	(2) 4.5 *2.25*	(2) *46.9*

Déné (Tribe "Tukkuthkutchin") crania.—Male.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
243,446	R. Kennicott	Fort McPherson, Peels River, Canada.	Adult		18.5	14.6	13.2
'8	do	do			19.1	15.3	13.3
Total					(2) 37.6	(2) 29.9	(2) 26.5
Average					*18.80*	*14.95*	*13.25*

Hare Indians crania.—Male.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
243,996	R. Kennicott	Fort Good Hope, Canada.	Adult		18	14.9	13.4

Apache crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
228,362	A. H.	San Carlos Agency, Ariz.	Adult	Slight asymmetry.	17.8	14.8	12.4
'3	A. H.	do	do		17.9	15.2	13.2
'59	A. H.	do	do		17.8	15.2	13.3
'60	A. H.	do	do		17.3	14.9	13
225,102	Var	"Arivapai Apache"	do		17.8	14.7	12.8
'076		Western Texas.	do		17	14.1	13.2
'094		"Mohave Apache"	do		17.4	14.5	12.9
243,786		Mescalero Agency	do		17.6	14.7	13.2
'860		"Yuma Apache"	do		17.2	14.4	12.4
'871		Camp Apache, Ariz.	do	Slight asymmetry.	17.8	15.1	12.1
'856		"Pinal Apache"	do		16.8	14.4	12.8
'876		Arivapai	do		17.8	15.3	13.3
'874		Fort Whipple	do		16.8	14.5	13.2
'857		"Pinal Apache"	do		16.9	14.8	13
'865		Camp Bowie, Ariz.	do	Moderate occipital flattening.	(16.8)	(15.5)	(12.8)
Total					(14) 243.9	(14) 206.6	(14) 180.8
Average					*17.42*	*14.76*	*12.9*

Déné (*Tribe "Tukkuthkutchin"*) *crania.—Male.*

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
78.9	79.8	15.43	1,440	[1] 12.4	7.5	15.3	81	49	3.45	4.05	85.2	5.4	2.4	44.4
80.1	77.3	15.90	1,550	[1] 12.4	7.5	14.5	85.5	51.7	3.2	4	80	5.5	2.6	47.3
(2) 79.5	(2) 78.5	(2) 15.67	(2) 2,990 1,495	(2) 24.8 12.4	(2) 15 7.5	(2) 29.8 14.9	(2) 83.2	(2) 50.3	(2) 6.65 3.32	(2) 8.05 4.02	(2) 82.6	(2) 10.9 5.45	(2) 5 2.5	(2) 45.9

Hare Indians crania.—Male.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
82.8	81.5	15.43	1,700	11.9	7	14.4	82.6	48.6	3.3	4.05	81.5	5.2	2.45	47.1

Apache crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
83.2	76.1	15	1,410	......	7.3	13.7	......	53.2	3.9	3.9	100	5.7	2.5	43.9
84.9	79.8	15.43	1,480	......	......	14.3	......	......	3.6	3.7	97.3	5.4	3.1	57.4
85.4	80.6	15.48	1,570	[1] 11.8	7.3	15.1	78.2	48.5	3.8	3.9	97.4	5.5	2.7	49.1
86.1	80.8	15.07	1,470	11.6	7.2	13.9	83.4	51.8	3.5	3.7	94.6	5.15	2.5	48.6
82.6	78.8	15.10	1,470	11.9	7.5	14.3	83.2	52.4	3.6	4	90	5.4	2.4	44.4
82.9	84.9	14.77	1,310	12.1	7.5	13.5	89.6	55.6	3.5	3.8	92.1	5.3	2.6	49.1
83.3	80.9	14.93	1,430	11.8	7	13.8	85.5	50.7	3.5	3.8	92.1	4.7	2.5	53.2
83.5	81.7	15.17	1,430	10.8	6.7	14.2	76.1	47.2	3.45	3.8	90.8	5	2.7	54
83.7	78.5	14.67	1,280	......	......	14.1	......	......	3.55	4.05	87.7	4.9	2.5	51
84.8	73.6	15	1,510	......	7.1	......	......	......	3.3	3.65	90.4	5	2.5	50
85.7	82	14.67	1,310	11.4	7.15	13.9	82	51.4	3.4	4.05	84	5.4	2.8	51.9
86	80.4	15.47	......	......	......	......	......	......	3.5	4.05	86.4	4.6	2.6	56.5
86.3	84.4	14.83	1,400	......	7.1	13.5	......	52.6	3.3	3.7	89.2	5	2.3	46
87.6	82	14.90	1,450	10.8	6.65	14.4	75	48.2	3.5	3.9	89.7	4.7	2.6	55.3
......	......	15.08	......	......	7.1	......	......	......	3.6	3.95	91.1	5.7	2.75	48.2
(14) 84.7	(14) 80.3	(15) 15.08	(13) 18,520 1,425	(8) 92.2 11.52	(12) 85.6 7.13	(12) 168.7 14.06	(8) 81.5	(10) 50.9	(15) 53 3.53	(15) 57.95 3.86	(15) 91.5	(15) 77.45 5.16	(15) 39.05 2.6	(15) 50.4

[1] Teeth moderately worn.

Apache crania—Continued.

FEMALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
225,100......	Var............	Tonto Apache.....	Adult.....	....	17.3	13.9	12.7
243,868......	....	.....do............	...do......	....	17.4	14.6	12.6
225,473......	....	Mescalero Apache.	...do......	....	16.5	14.4	12.3
'101......	....	Arivapai..........	...do......	....	16	14	12.1
243,872......	....	"Pinal Apache"..	...do......	....	15.6	13.8	11.6
'785......	....	Mescalero Apache.	...do......	Very slight occipital flattening.	16.6	14.8	13.1
'869......	....	Jicarilla Apache...	...do......	....	15.7	14.4	12.6
Total....	....	....	....	....	(7) 115.1	(7) 99.9	(7) 87
Average[1]	....	....	....	....	*16.44*	*14.27*	*12.43*

[1] Occasionally among the Apaches there will occur an oblong cranium of a different type; that is doubtless a result of adoption from some other tribe.

Lipan crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
243,485......	Var............	Sta. Rosa, Mexico.	Adult.....	....	18.6	14.6	12.8
'7......	....	Southwestern Texas.	...do......	....	17.5	14.4	13.4
Total....	....	....	....	....	(2) 36.1	(2) 29	(2) 26.2
Average.	....	....	....	....	*18.05*	*14.5*	*13.1*

FEMALE.

243,476......	D. Jackson......	Southwestern Texas.	Adult.....	....	17.3	14.6	12.6

Apache crania—Continued.

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
80.4	*81.4*	14.63	1,350	......	6.4	14	....	*45.7*	3.65	3.9	*93.6*	4.7	2.5	*53.2*
83.9	*78.8*	14.87	1,430	......	6.7	13.2	....	*50.8*	3.4	3.8	*89.5*	4.8	......	....
87.3	*79.6*	14.40	1,190	[1]10.1	6.3	13.6	*74.3*	*47.8*	3.2	3.77	*84.8*	4.7	2.7	*57.4*
87.5	*80.7*	14.03	1,280	......	6.2	12.6	....	*49.2*	3.3	3.6	*91.7*	4.6	2.5	*54.4*
88.5	*78.9*	13.67	1,180	......	6	....	....	....	3.2	3.5	*91.4*	4.3	2.3	*53.5*
89.2	*83.4*	14.83	1,370	10.8	....	13.8	*78.3*	....	3.6	4	*90*	5.2	2.8	*53.8*
91.7	*83.7*	14.23	....	......	....	....	....	....	......	......	....	......	......	....
(7)	(7)	(7)	(6)	(2)	(5)	(5)	(2)	(4)	(6)	(6)	(6)	(6)	(5)	(5)
......	......	....	7,800	20.9	31.8	67.2	....	....	20.35	22.57	....	28.3	12.8	....
86.8	*80.9*	*14.38*	*1,300*	*10.45*	*6.36*	*13.44*	*76.3*	*48.3*	*3.39*	*3.76*	*90.1*	*4.72*	*2.56*	*54.5*

[1] Teeth moderately worn.

Lipan crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
78.6	*77.1*	15.33	1,510	......	6.9	13.8	....	*50*	3.5	4.2	*83.3*	5.2	2.5	*48.1*
82.3	*84*	15.10	1,500	......	7.9	14.5	....	*54.6*	3.7	4	*92.5*	5.8	2.9	*50*
(2)	(2)	(2)	(2)	......	(2)	(2)	....	(2)	(2)	(2)	(2)	(2)	(2)	(2)
......	......	....	3,010	......	14.8	28.3	....	....	7.2	8.2	....	11	5.4	....
80.5	*80.5*	*15.22*	*1,505*	......	*7.4*	*14.15*	....	*52.3*	*3.6*	*4.1*	*87.8*	*5.5*	*2.7*	*49.1*

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
84.4	*79*	14.83	1,470	......	....	13.7	....	....	3.5	3.9	*89.7*	5.1	2.7	*52.9*

Alaska and Athapascan crania: Summary of measurements.

MALE.

	Aleuts.	Miscellaneous Alaskan.	Tlinkit.	Haida.	Déné.	Hare.	Apache (Arizona and New Mexico).	Lipan (Texas and Mexico).
Number of skulls	(25)	(7)	(8)	(2)	(2)	(1)	(15)	(2)
Vault:								
Length	18.29	18.33	18.70	17.75	18.80	18	17.42	18.05
Breadth	15.06	14.57	14.86	14.90	14.95	14.90	14.76	14.50
Height	12.76	13.08	13.86	13.40	13.25	13.40	12.90	13.10
Cranial Index	*82.3*	*79.5*	*79.4*	*83.9*	*79.5*	*82.8*	*84.7*	*80.3*
Mean Height Index	*76.6*	*79.5*	*82.6*	*82.1*	*78.5*	*81.5*	*80.3*	*80.5*
Modulo	15.36	15.33	15.77	15.35	15.67	15.43	15.03	15.22
Capacity	1,561	1,521	1,610	1,500	1,495	(1,700)	1,425	1,505
Face:								
M.-N. Height	12.07	11.70	12.60	12.20	12.40	11.90	11.52	....
Alv. Pt.-N. Height	7.42	7.42	7.87	7.35	7.50	7	7.13	7.40
Alv. Pt.-N. Breadth	14.62	14.47	14.36	13.95	14.90	14.40	14.08	14.15
Facial Index:								
Total	*82.5*	*83.3*	*85.8*	*87.5*	*83.2*	*82.6*	*81.5*	....
Upper	*50.7*	*51.7*	*53.8*	*52.7*	*50.3*	*48.6*	*50.9*	*52.3*
Orbits:								
Mean height	3.61	3.56	3.74	....	3.32	3.30	3.53	3.60
Mean breadth	4.03	4.03	4.02	....	4.02	4.05	3.86	4.10
Mean Index	*89.5*	*88.3*	*92.9*	....	*82.6*	*81.5*	*91.5*	*87.8*
Nose:								
Height	5.32	5.29	5.5	5.45	5.45	5.20	5.16	5.50
Breadth	2.58	2.66	2.6	2.75	2.50	2.45	2.6	2.70
Index	*48.5*	*50.3*	*47*	*50.5*	*45.9*	*47.1*	*50.4*	*49.1*

FEMALE.

	Aleuts.	Miscellaneous Alaskan.	Tlinkit.	Haida.	Apache.	Lipan.
Number of skulls	(28)	(6)	(4)	(2)	(7)	(1)
Vault:						
Length	17.40	17.52	17.70	17.10	16.44	17.30
Breadth	14.51	14.04	14.35	14	14.27	14.60
Height	12.27	13.04	12.50	12.90	12.43	12.60
Cranial Index	*83.4*	*80.1*	*81.1*	*81.9*	*86.8*	*84.4*
Mean Height Index	*76.9*	*82.6*	*78*	*82.9*	*80.9*	*79*
Module	14.73	14.84	14.65	14.67	14.38	14.83
Capacity	1,385	1,323	1,338	1,185	1,300	1,470
Face:						
M.-N. Height	11.71	11.50	11.55	....	10.45	....
Alv. Pt.-N. Height	7.12	7.06	6.98	6.90	6.36	....
Alv. Pt.-N. Breadth	13.33	13.08	13.43	13.35	13.44	13.70
Facial Index:						
Total	*88.5*	*88.1*	*86.2*	....	*76.3*	....
Upper	*53.5*	*54.9*	*51.6*	*51.7*	*48.3*	....
Orbits:						
Mean height	3.57	3.57	3.55	3.45	3.39	3.50
Mean breadth	3.85	3.77	3.82	3.75	3.76	3.90
Mean Index	*92.7*	*94.2*	*92.8*	*92*	*90.1*	*89.7*
Nose:						
Height	5.05	5.08	5.04	4.80	4.72	5.10
Breadth	2.41	2.43	2.35	2.25	2.56	2.70
Index	*48*	*47.3*	*46.7*	*46.9*	*54.5*	*52.9*

NOTES ON THE ALASKAN AND ATHAPASCAN CRANIA.

The results of the measurements of these crania show a number of noteworthy features, which may be briefly pointed out as follows:

1. In their main characteristics there is a high degree of relation in all the Alaska Indian and the Athapascan crania. The groups they represent are clearly all of one and the same basic type, marked, on the average, by higher meso- to brachycephaly, an extraordinarily

low vault, a relatively high cranial size and capacity, a broad face in the males, giving relatively low facial indices, mesoseme to moderately megaseme orbits, and mesorhinic nose.

2. The Aleuts are plainly Indians of the general type prevailing in the peninsula.

3. No marks of distinction exist between the Alaska Indians at large and the Athapascans. The Apache, who are the southernmost branch of the Athapascans, show, however, the highest brachycephaly and also the highest nasal index, of which the latter at least may have been brought about by their present habitat in New Mexico and Arizona.

MONGOLS.

Mongolian crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
278,794	A. Hrdlička	Urga, Mongolia	Adult		19.8	14.6	13.0
278,782	do	do	do		19.3	14.3	13.9
278,772	do	do	do		18.8	14.2	12.0
278,783	do	do	do		19.2	14.5	13.2
278,768	do	do	do		19.3	14.6	13.6
278,914	do	do	do		18.4	14.1	13.3
278,791	do	do	do		18.6	14.3	12.6
278,793	do	do	do		18.7	14.4	12.3
278,769	do	do	do		19.2	14.8	13.4
278,777	do	do	do		19.2	14.8	13.0
278,781	do	do	do		18.1	14	13.1
278,856	do	do	do		19.4	15.0	12.8
278,860	do	do	do		19.6	15.2	13.0
278,870	do	do	do		19.6	15.2	13.7
278,775	do	do	do		18.8	14.6	14.0
278,798	do	do	do		18.5	14.4	11.8
278,896	do	do	do		18.3	14.3	13.2
278,848	do	do	do		18.3	14.3	13.6
278,833	do	do	do	Moderate flat-head deformation.	18.4	14.4	13.2
278,789	do	do	do		18.6	14.6	13.1
278,865	do	do	do	Very slight asymmetry.	19.1	15.0	13.6
278,802	do	do	do		17.8	14.0	12.0
278,841	do	do	do		18.2	14.3	12.2
278,736	do	do	do		18.8	14.8	13.4
278,924	do	do	do	Moderate asymmetry.	18.8	14.8	13.4
278,876	do	do	do		17.9	14.1	13.4
278,776	do	do	do		18.5	14.6	12.8
278,829	do	do	do		18.5	14.6	13.0
278,873	do	do	do	Very slight asymmetry.	19.0	15.0	14.0
278,803	do	do	do		18.2	14.4	12.5
278,809	do	do	do		18.7	14.8	13.6
278,899	do	do	do		18.4	14.6	13.4
278,883	do	do	do		18.5	14.7	13.4
278,886	do	do	do		18.5	14.7	12.7
278,843	do	do	do		19.1	15.2	13.3
278,796	do	do	do		18.6	14.8	13.7
278,820	do	do	do		19.2	15.3	13.4
278,828	do	do	do		18.3	14.6	13.2
278,889	do	do	do		18.8	15.0	13.2
278,900	do	do	do		18.3	14.6	13.2
278,916	do	do	do		17.9	14.3	12.8
278,785	do	do	do		19.0	15.2	13.9
278,808	do	do	do		19.0	15.2	14.2
278,907	do	do	do		18.0	14.4	12.8
278,790	do	do	do		19.1	15.3	14.0
278,888	do	do	do		19.2	15.4	13.5
278,872	do	do	do		18.2	14.6	13.0
278,852	do	do	do		18.5	14.9	13.5
278,842	do	do	do	Slight asymmetry.	19.1	15.4	12.6
278,915	do	do	do		18.6	15.0	13.2
278,927	do	do	do	Syphilis	18.6	15.0	13.3
278,830	do	do	do		17.8	14.4	12.5
278,877	do	do	do		17.8	14.4	13.1
278,854	do	do	do		17.6	14.3	13.2
278,857	do	do	do	Very slight occipital compression.	18.6	15.1	12.7
278,745	do	do	do		17.2	14.0	13.4
278,822	do	do	do		19.4	15.8	12.9
278,806	do	do	do	Slight asymmetry.	19.6	16.0	13.4
278,862	do	do	do		17.9	14.6	13.3

MONGOLS.

Mongolian crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a \times 100}{c}\right)$	*Facial Index, upper* $\left(\frac{b \times 100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose, Breadth maxim.	*Nasal Index.*
73.7	*75.6*	15.80	1,680	......	7.5	14.6	....	*51.4*	3.75	4.1	*91.5*	5.7	3.0	*52.*
74.1	*82.7*	15.83	1,520	13.7	8.3	14.0	*97.9*	*59.3*	3.6	3.75	*96.0*	6.0	2.4	*40*
75.5	*72.7*	15.00	1,550	12.6	7.8	....	....	....	3.75	4.1	*91.5*	5.7	2.5	*43.9*
75.5	*78.3*	15.63	1,550	......	7.8	13.8	....	*56.5*	3.4	4.05	*84*	5.9	2.8	*47.5*
75.7	*80.7*	15.83	1,730	......	......	13.6	....	....	3.65	3.9	*93.6*	5.6	2.5	*44.6*
76.6	*81.8*	15.27	1,430	......	6.7	14.0	....	*47.9*	3.0	3.75	*80.0*	5.3	2.9	*54.7*
76.9	*76.6*	15.17	1,500	......	8.0	13.8	....	*58*	3.5	3.85	*90.9*	5.7	2.7	*47.4*
77	*74.3*	15.13	1,500	......	......	....	....	....	3.55	3.75	*94.7*	5.8	2.7	*46.6*
77.1	*78.8*	15.80	1,630	......	......	14.3	....	....	3.55	3.8	*93.4*	5.5	2.9	*52.7*
77.1	*76.5*	15.67	1,610	12.6	7.1	14.8	*85.1*	*48.0*	3.85	4.15	*92.8*	5.9	2.9	*49.2*
77.3	*81.6*	15.07	1,450	......	7.9	13.9	....	*56.8*	3.55	3.85	*92.2*	5.8	2.7	*46.6*
77.3	*74.4*	15.73	1,560	13.1	7.8	14.3	*91.6*	*54.5*	3.4	3.7	*91.9*	5.7	2.4	*42.1*
77.6	*74.7*	15.93	1,620	......	8.1	14.1	....	*57.5*	3.7	4.0	*92.5*	5.8	2.8	*48.3*
77.6	*78.7*	16.17	1,750	......	8.4	15.1	....	*55.6*	3.5	4.1	*85.4*	6.2	2.8	*45.2*
77.7	*83.8*	16.03	1,740	......	8.5	13.6	....	*62.5*	3.9	3.8	*102.6*	5.9	2.5	*42.4*
77.8	*71.7*	14.90	1,500	......	7.4	13.7	....	*54*	3.35	3.75	*89.3*	5.4	2.6	*48.2*
78.1	*81*	15.27	1,510	......	8.0	14.5	....	*55.2*	3.55	3.6	*98.6*	5.9	2.8	*47.5*
78.1	*83.4*	15.40	1,530	12.5	7.6	14.0	*89.3*	*54.3*	3.35	3.85	*87.0*	5.5	2.7	*49.1*
78.3	*80.5*	15.33	1,480	......	7.3	14.2	....	*51.4*	3.65	4.15	*88*	5.3	2.7	*50.9*
78.5	*78.9*	15.43	1,510	12.4	7.8	14.3	*88.7*	*54.5*	3.5	4.0	*87.5*	5.8	2.9	*50*
78.5	*79.8*	15.90	1,770	......	7.9	14.1	....	*56*	3.75	4.0	*93.8*	5.9	2.6	*44.1*
78.6	*75.5*	14.60	1,330	11.9	....	13.2	*90.2*	....	3.4	3.85	*88.3*	5.4	3.0	*55.6*
78.6	*75.1*	14.90	1,340	......	....	....	....	....	3.6	4.1	*87.8*	5.1	2.8	*54.9*
78.7	*79.8*	15.67	1,620	......	....	14.6	....	....	3.7	4.0	*92.5*	6.1	2.7	*44.3*
78.7	*79.8*	15.67	1,650	......	6.5	13.8	....	*47.1*	3.2	3.65	*87.7*	5.0	2.7	*54*
78.8	*83.8*	15.13	1,410	......	....	....	....	....	3.4	3.55	*95.8*	5.4	2.8	*51.8*
78.9	*77.3*	15.30	1,550	13.6	8.0	14.6	*93.2*	*54.8*	3.7	4.0	*92.5*	5.9	3.0	*50.8*
78.9	*78.6*	15.37	1,430	......	8.0	14.5	....	*55.1*	3.45	4.05	*85.2*	5.8	2.8	*48.3*
79	*82.4*	16.00	1,720	......	....	14.2	....	....	3.8	4.1	*92.7*	5.7	2.9	*50.9*
79.1	*76.7*	15.03	1,500	......	....	13.9	....	....	3.7	4.0	*92.5*	5.8	2.8	*48.3*
79.1	*81.2*	15.70	1,600	......	8.1	15.5	....	*52.3*	3.65	3.9	*93.6*	6.1	2.9	*47.5*
79.4	*81.2*	15.47	1,500	......	8.3	14.8	....	*56.1*	....	....	....	6.0	2.7	*45*
79.5	*80.7*	15.53	1,620	......	7.6	14.6	....	*52.1*	3.7	3.7	*100*	6.0	3.0	*50*
79.5	*76.5*	15.30	1,450	......	....	14.5	....	....	....	....	....	6.0	3.0	*50*
79.6	*77.6*	15.87	1,480	11.5	7.8	14.7	*78.2*	*53.1*	3.35	3.9	*85.9*	6.0	3.0	*50*
79.6	*82.0*	15.70	1,610	12.5	....	14.2	*88.0*	....	3.6	4.0	*90*	5.6	3.0	*53.6*
79.7	*77.7*	15.97	1,710	......	7.3	14.6	....	*50*	3.7	4.0	*92.5*	5.4	2.9	*53.7*
79.8	*80.2*	15.37	1,510	......	....	13.7	....	....	3.25	3.75	*86.7*	5.3	3.1	*58.5*
79.8	*78.1*	15.67	1,580	......	7.6	14.7	....	*51.7*	3.4	3.95	*86.1*	5.6	2.5	*44.6*
79.8	*80.2*	15.37	1,490	......	7.9	13.9	....	*56.8*	3.7	3.7	*100*	5.8	2.5	*43.1*
79.9	*79.5*	14.67	1,460	......	7.4	14.3	....	*51.7*	3.4	3.8	*89.5*	5.5	2.7	*49.1*
80	*81.3*	16.03	1,740	......	8.3	....	....	....	3.75	4.1	*91.5*	6.2	3.0	*48.4*
80	*83.0*	16.13	1,680	12.8	7.5	14.8	*86.5*	*50.7*	3.5	3.8	*92.1*	5.5	2.5	*45.4*
80	*79.0*	15.67	1,500	......	7.6	13.7	....	*55.5*	3.6	4.0	*90*	6.0	2.8	*46.7*
80.1	*81.4*	16.13	1,650	......	8.4	14.8	....	*56.8*	4.0	3.9	*102.6*	6.0	2.6	*43.3*
80.2	*78.0*	16.03	(1,825)	......	8.1	14.4	....	*56.2*	3.9	3.8	*102.6*	5.6	2.6	*46.4*
80.2	*79.3*	15.27	1,500	......	....	14.1	....	....	3.55	4.0	*88.8*	5.6	3.0	*53.6*
80.5	*80.8*	15.63	1,670	13.9	8.4	14.0	*99.3*	*60*	4.05	4.1	*98.8*	5.8	2.9	*50*
80.6	*75.0*	15.70	1,450	......	....	14.5	....	....	3.3	3.75	*88.0*	6.0	2.8	*46.7*
80.6	*78.6*	15.90	1,630	......	8.0	13.4	....	*59.7*	3.75	4.0	*93.8*	5.6	2.6	*46.4*
80.6	*79.2*	15.63	1,510	......	8.1	14.3	....	*56.6*	3.7	4.1	*90.2*	6.2	2.9	*46.8*
80.9	*77.6*	14.90	1,410	12.0	7.4	14.0	*85.7*	*52.9*	3.45	3.75	*92*	......	2.7	....
80.9	*81.4*	15.10	1,690	......	....	14.2	....	....	3.9	3.9	*100*	4.9	2.5	*51.0*
81.2	*82.8*	15.03	1,470	12.2	7.3	13.9	*87.8*	*52.5*	3.5	3.85	*90.9*	5.4	2.8	*51.8*
81.2	*75.4*	15.47	1,600	......	7.8	13.5	....	*57.8*	3.45	4.0	*86.2*	5.6	2.9	*51.8*
81.4	*85.9*	14.87	1,440	......	7.2	13.4	....	*53.7*	3.35	3.9	*85.9*	5.4	2.7	*50*
81.4	*73.3*	16.03	1,660	......	8.3	15.0	....	*55.3*	3.95	4.1	*96.3*	5.9	3.0	*50.8*
81.6	*75.3*	16.33	1,690	......	8.9	....	....	....	4.15	4.2	*98.8*	6.5	2.7	*41.5*
81.6	*81.8*	15.27	1,485	......	7.6	13.6	....	*55.9*	3.25	3.65	*94.5*	5.8	2.6	*44.8*

Mongolian crania—Continued.

MALE—Continued.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
278,863	A. Hrdlička	Urga, Mongolia	Adult		17.4	14.2	12.3
278,847	do	do	do		18.6	15.2	13.1
278,879	do	do	do		18.6	15.2	12.2
278,821	do	do	do		18.7	15.3	13.9
278,910	do	do	do		19.2	15.7	13.1
278,894	do	do	do		19.4	15.9	13.4
278,743	do	do	do		19.0	15.6	13.1
278,832	do	do	do		17.3	14.2	12.8
278,827	do	do	do		17.6	14.5	12.2
278,880	do	do	do		18.2	15.0	12.8
278,855	do	do	Very near adult.		18.3	15.1	13.3
278,890	do	do	Adult		17.7	14.6	12.9
278,901	do	do	do		19.0	15.7	13.6
278,902	do	do	do		18.4	15.2	14.4
278,853	do	do	do		18.0	14.9	12.9
278,866	do	do	do		18.0	14.9	13.8
278,835	do	do	do		18.8	15.6	11.5
278,759	do	do	do		17.9	14.9	12.8
278,844	do	do	do		17.8	14.8	12.7
278,788	do	do	do		17.8	14.8	13.2
278,891	do	do	do		18.0	15.0	12.1
278,744	do	do	do		19.3	16.1	13.3
278,747	do	do	Near senile		18.6	15.5	13.4
278,859	do	do	Adult		18.2	15.2	13.0
278,861	do	do	do		19.4	16.2	13.4
278,878	do	do	do		17.6	14.7	13.2
278,917	do	do	do		17.8	14.9	12.8
278,816	do	do	do	Very slight asymmetry.	18.1	15.2	13.0
278,811	do	do	do		18.3	15.4	12.7
278,732	do	do	do		18.1	15.3	12.6
278,875	do	do	do		18.7	15.8	13.6
278,758	do	do	do	Slight asymmetry.	17.5	14.8	12.8
278,834	do	do	do	Very slight asymmetry.	17.7	15.0	13.3
278,757	do	do	do		18.4	15.6	......
278,748	do	do	do		18.6	15.8	13.8
278,767	do	do	do		18.0	15.3	13.3
278,845	do	do	do	Very slight assymmetry.	17.4	14.8	12.7
278,729	do	do	do		18.3	15.6	13.1
278,735	do	do	do	Very slight asymmetry.	18.3	15.6	13.2
278,884	do	do	do		18.6	15.9	13.1
278,754	do	do	do		18.0	15.4	13.1
278,755	do	do	do		18.2	15.6	12.9
278,849	do	do	do		17.7	15.2	13.4
278,805	do	do	do		18.5	16.0	13.1
278,760	do	do	do		18.6	16.1	......
278,887	do	do	do		18.0	15.6	13.2
278,725	do	do	do	Moderate occipital compression.	(17.5)	(15.2)	(13.2)
278,723	do	do	do		18.5	16.1	13.2
278,741	do	do	do		18.4	16.0	12.4
278,731	do	do	do		18.2	15.9	12.9
278,814	do	do	do		18.2	15.9	13.0
278,722	do	do	do		17.6	15.4	13.4
278,740	do	do	do		17.2	15.1	13.8
278,724	do	do	do		17.4	15.4	12.0
278,751	do	do	do		17.3	15.9	13.0
Total	do				(113) 2,082.8	(113) 1,696.4	(111) 1,454.3
Average	do				*18.40*	*15.01*	*13.10*

Mongolian crania—Continued.

MALE—Continued.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
81.0	*77.8*	14.63	1,370	......	......	13.2	......	......	3.4	3.65	*93.2*	5.5	2.7	*49.1*
81.7	*77.5*	15.03	1,565	......	7.6	14.2	......	*53.5*	3.4	3.75	*90.7*	5.6	2.8	*50*
81.7	*72.2*	15.33	1,450	......	......	14.6	......	......	3.75	4.2	*89.3*	5.9	2.7	*45.8*
81.8	*81.8*	15.97	(1,800)	......	6.9	13.9	......	*49.6*	3.25	3.6	*90.3*	5.15	2.8	*54.4*
81.8	*75.1*	16.00	1,730	......	8.0	14.7	......	*54.4*	3.75	4.3	*87.2*	5.9	3.0	*50.8*
82	*75.9*	16.23	1,760	......	......	......	......	......	......	......	......	5.8	3.0	*51.7*
82.1	*75.7*	15.90	1,630	13.3	8.1	......	......	......	3.7	4.1	*90.2*	6.0	3.0	*50*
82.1	*81.3*	14.77	1,390	11.6	7.2	12.7	*91.3*	*56.6*	3.4	3.8	*89.5*	5.3	2.2	*41.5*
82.4	*76.0*	14.77	(1,315)	12.3	7.4	13.8	*89.1*	*53.6*	3.45	3.8	*90.8*	5.3	2.7	*50.9*
82.4	*77.1*	15.33	1,530	......	......	14.7	......	......	3.8	4.0	*95*	5.7	2.8	*49.1*
82.5	*79.6*	15.57	1,660	12.1	7.0	13.2	*91.7*	*57.6*	3.7	3.72	*99.5*	5.7	2.7	*47.4*
82.5	*70.9*	15.07	1,480	......	7.4	13.7	......	*54.0*	3.7	4.0	*92.5*	5.6	2.5	*44.6*
82.6	*78.4*	16.10	1,700	......	8.1	14.1	......	*57.5*	3.6	4.0	*90*	5.7	3.1	*54.4*
82.6	*85.7*	16.00	1,690	......	7.6	14.3	......	*53.2*	3.95	4.25	*92.9*	5.6	2.8	*50*
82.8	*78.4*	15.27	1,640	......	7.1	13.4	......	*53.0*	3.6	3.7	*97.3*	5.3	2.4	*45.3*
82.8	*83.9*	15.57	1,650	......	......	13.7	......	......	3.3	3.6	*91.7*	4.8	2.6	*54.2*
83	*66.9*	15.30	1,600	12.7	8.0	14.8	*86.8*	*54.1*	4.0	4.25	*94.1*	5.7	2.8	*49.1*
83.2	*78.0*	15.20	1,450	......	......	......	......	......	3.7	3.9	*94.9*	5.3	2.6	*49.1*
83.2	*77.9*	15.10	1,515	......	6.6	13.7	......	*48.2*	3.3	3.7	*89.2*	5.1	2.8	*54.9*
83.2	*81.0*	15.27	1,530	12.1	7.6	14.4	*84*	*52.8*	3.7	3.9	*94.9*	5.3	2.6	*49.1*
83.3	*73.3*	15.03	1,550	......	8.0	14.0	......	*57.2*	3.5	3.85	*90.9*	5.7	2.7	*47.4*
83.4	*75.1*	16.23	1,670	......	......	......	......	......	3.8	4.35	*87.4*	5.6	2.8	*50*
83.4	*78.6*	15.88	1,630	......	......	15.3	......	......	3.8	4.25	*89.4*	5.9	3.0	*50.8*
83.5	*77.8*	15.47	1,550	......	8.1	14.3	......	*56.6*	3.4	3.85	*88.4*	5.9	2.7	*45.8*
83.5	*75.3*	16.33	1,690	......	8.6	15.5	......	*55.5*	3.35	4.1	*81.7*	6.3	3.2	*50.8*
83.5	*81.7*	15.17	1,440	......	......	14.0	......	......	3.3	3.95	*83.6*	5.0	2.7	*54*
83.7	*78.3*	15.17	1,550	......	7.5	14.3	......	*52.4*	3.5	3.8	*92.1*	5.7	2.9	*50.9*
84.0	*78.1*	15.43	1,590	12.6	7.6	13.9	*90.6*	*54.7*	3.3	3.65	*90.4*	5.6	......	......
84.2	*75.4*	15.47	1,540	13.3	8.3	14.1	*94.3*	*58.8*	3.6	4.0	*90*	6.1	2.4	*39.3*
84.5	*75.4*	15.33	1,500	......	8.8	14.4	......	*61.1*	3.7	4.0	*92.5*	6.0	3.0	*50*
84.5	*78.8*	16.08	1,740	......	......	......	......	......	3.55	3.7	*95.9*	5.6	2.7	*48.2*
84.6	*79.3*	15.03	1,520	......	......	......	......	......	3.45	3.7	*93.2*	5.6	2.8	*50*
84.7	*81.4*	15.33	1,540	12.3	7.5	14.2	*86.6*	*52.8*	3.6	3.9	*92.3*	5.6	2.6	*46.4*
84.8	......	......	1,560	......	......	15.1	......	......	3.55	4.0	*88.8*	6.0	3.0	*50*
84.9	*80.2*	16.07	1,620	......	8.5	15.1	......	*56.3*	3.85	4.1	*93.9*	5.9	2.8	*47.5*
85.0	*79.9*	15.53	1,620	......	7.9	14.2	......	*55.6*	3.85	4.0	*96.2*	5.4	2.6	*48.2*
85.1	*78.9*	14.97	1,345	......	......	13.9	......	......	3.6	3.9	*92.3*	5.6	2.8	*50*
85.2	*77.3*	15.67	1,590	12.6	......	14.7	*85.7*	......	3.5	4.1	*85.4*	5.2	2.8	*53.8*
85.2	*77.9*	15.70	1,620	......	......	14.0	......	......	3.55	3.85	*92.2*	5.5	2.6	*47.3*
85.5	*75.9*	15.87	1,710	......	7.6	13.9	......	*54.7*	3.45	4.0	*86.2*	5.6	2.5	*44.6*
85.6	*78.4*	15.80	1,530	13.6	......	14.3	*95.1*	......	3.85	4.15	*92.4*	5.7	2.7	*47.4*
85.7	*76.3*	15.57	1,620	......	......	13.9	......	......	3.55	3.95	*89.9*	5.5	2.6	*47.3*
85.9	*81.5*	15.43	1,550	12.6	7.7	14.3	*88.1*	*53.8*	3.7	3.75	*48.7*	5.8	2.6	*44.8*
86.5	*75.9*	15.87	1,685	......	......	14.9	......	......	3.8	4.2	*90.5*	6.0	2.7	*45*
86.6	......	......	1,750	......	8.7	15.5	......	*56.1*	3.85	4.5	*85.6*	6.2	2.9	*46.8*
86.7	*78.6*	15.60	1,740	......	8.1	14.6	......	*55.5*	3.8	4.2	*90.5*	5.9	2.5	*42.4*
(*86.9*)	(*80.7*)	15.30	1,660	12.0	7.0	14.2	*84.5*	*49.3*	3.5	3.9	*89.7*	4.8	2.7	*56.2*
87.0	*76.8*	15.93	1,810	......	7.8	15.4	......	*50.6*	3.7	4.2	*88.1*	5.3	3.0	*56.6*
87.0	*72.1*	15.60	1,545	......	7.4	14.3	......	*51.8*	3.75	4.2	*89.3*	5.4	2.7	*50*
87.4	*75.7*	15.67	1,610	......	7.2	......	......	......	3.6	4.0	*90*	5.5	2.9	*52.7*
87.4	*76.2*	15.70	1,640	......	......	14.4	......	......	3.5	3.9	*89.7*	5.5	3.0	*54.3*
87.5	*81.2*	15.47	1,530	......	8.2	14.2	......	*57.8*	3.8	3.9	*97.4*	6.0	2.9	*48.3*
87.8	*85.4*	15.37	1,570	12.4	7.5	13.9	*89.2*	*54.0*	3.35	3.8	*88.2*	5.5	2.5	*45.4*
88.5	*73.2*	14.93	1,550	12.1	7.3	14.4	*84.0*	*50.7*	3.7	4.0	*92.5*	5.6	2.5	*44.6*
91.9	*78.3*	15.40	1,660	......	......	14.5	......	......	3.7	4.0	*92.5*	6.0	2.7	*45*
(*113*)	(*111*)	(114)	(112)	(29)	(79)	(103)	(*27*)	(*74*)	(112)	(112)	(*112*)	(114)	(114)	(*114*)
......	......	......	17,617	364.9	613.8	1,451.1	......	......	402.95	440.52	......	646.25	314	......
84.4	*78.4*	*15.51*	*1,568*	*12.58*	*7.78*	*14.09*	*88.8*	*54.5*	*3.59*	*3.93*	*91.5*	*5.66*	*2.75*	*48.6*

Mongolian crania—Continued.

FEMALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
278,913		Urga, Mongolia	Adult		18.2	13.6	12.5
278,779		do	do		17.8	13.4	12.4
278,797		do	do		17.5	13.2	12.4
278,770		do	do		18.5	14.0	12.0
278,778		do	do		17.7	13.4	12.6
278,800		do	do		18.2	13.8	13.0
278,787		do	do	Very slight asymmetry.	18.1	14.0	13.0
278,795		do	do		18.6	14.4	13.5
278,792		do	do	Very slight asymmetry.	17.6	13.7	12.4
278,773		do	do		18.6	14.5	12.8
278,788		do	do		17.5	13.7	12.4
278,784		do	do		18.1	14.2	13.0
278,804		do	do		18.4	14.5	13.2
278,909		do	do		18.1	14.3	12.4
278,801		do	do		17.7	14.0	12.6
278,926		do	do		17.7	14.0	12.4
278,825		do	do		17.9	14.2	12.5
278,851		do	do		18.2	14.5	13.0
278,885		do	do		16.8	13.4	11.7
278,903		do	do		17.3	13.8	12.3
278,799		do	do		17.4	13.9	12.5
278,839		do	do		17.9	14.4	12.0
278,815		do	do		18.0	14.5	12.7
278,838		do	do	Slight asymmetry.	17.3	14.0	12.0
278,807		do	do		16.3	13.2	11.8
278,823		do	do		17.0	13.8	12.2
278,824		do	do	Marked occipital compression.	(17.6)	(14.3)	(12.8)
278,846		do	do		18.2	14.8	12.7
278,869		do	do		16.7	13.6	11.8
278,893		do	do		17.2	14.0	11.8
278,868		do	do		17.5	14.3	13.0
278,906		do	do		17.8	14.6	12.2
278,810		do	do		16.8	13.8	13.1
278,840		do	do	Very slight asymmetry.	17.9	14.7	12.7
278,864		do	do		17.5	14.4	12.6
278,739		do	do	Very slight occipital compression.	17.0	14.0	12.8
278,874		do	do		17.0	14.0	12.8
278,904		do	do		17.6	14.5	13.0
278,911		do	Very near adult.		17.7	14.6	13.2
278,813		do	Adult		17.3	14.3	12.4
278,826		do	do		18.1	15.0	13.0
278,730		do	do		17.7	14.7	12.9
278,836		do	do		17.4	14.5	12.1
278,850		do	do	Very slight asymmetry.	18.0	15.0	12.6
278,881		do	do		16.8	14.0	12.1
278,812		do	do		17.9	14.2	12.8
278,817		do	do		17.0	14.2	12.5
278,867		do	do		16.8	14.1	13.0
278,882		do	do		17.4	14.6	12.1
278,721		do	do		18.0	15.1	12.8
278,720		do	do		17.4	14.6	12.2
278,728		do	do	Very slight occipital compression.	17.0	14.3	12.6
278,737		do	do	do	16.7	14.1	12.8
278,831		do	do		16.8	14.2	13.2
278,871		do	do		17.4	14.7	12.4
278,892		do	do		16.8	14.2	12.5
278,896		do	do		16.1	13.6	12.6
278,746		do	do		16.6	14.1	12.1

Mongolian crania—Continued.

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c.c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
74.7	*78.6*	14.77	1,450	......	7.0	13.0	....	*53.9*	3.5	3.65	*95.9*	5.0	2.3	*46*
75.2	*79.5*	14.53	1,250	11.7	6.9	12.5	*93.6*	*55.2*	3.6	3.8	*94.7*	5.3	2.7	*50.9*
75.4	*80.8*	14.33	1,310	11.3	6.9	12.9	*87.6*	*53.5*	3.45	3.6	*95.8*	5.0	2.7	*54*
75.7	*73.8*	14.83	1,510	......	......	13.4	....	....	3.8	3.9	*97.4*	5.4	2.4	*44.4*
75.7	*81.0*	14.57	1,450	10.9	6.8	12.7	*85.8*	*53.5*	3.45	3.5	*98.6*	5.2	2.4	*46.2*
75.8	*81.2*	15.00	1,480	......	7.3	13.6	....	*53.6*	3.4	3.9	*87.2*	5.2	2.8	*53.8*
77.4	*81.0*	15.03	1,470	......	......	13.3	....	....	3.4	3.5	*97.1*	4.9	2.5	*51*
77.4	*81.8*	15.17	1,550	......	7.8	13.0	....	*60*	3.65	3.75	*97.3*	5.4	2.7	*50*
77.8	*79.2*	14.57	1,310	......	7.3	13.0	....	*56.2*	3.8	4.0	*95.0*	5.3	2.5	*47.2*
78.0	*77.3*	15.30	1,480	......	......	......	....	....	3.4	3.9	*87.2*	5.0	2.9	*58*
78.3	*79.5*	14.53	1,410	10.9	6.9	12.7	*85.8*	*54.4*	3.75	3.8	*98.7*	5.1	2.4	*47.1*
78.4	*80.5*	15.10	1,385	11.2	6.7	13.2	*84.8*	*50.8*	3.45	3.8	*90.8*	5.2	2.7	*51.9*
78.8	*80.2*	15.37	......	......	......	......	....	....	3.65	3.85	*94.8*	5.4	2.4	*44.4*
79	*76.5*	14.93	1,420	......	6.9	......	....	....	3.60	3.95	*91.2*	5.2	2.6	*50*
79.1	*79.5*	14.77	1,470	11.7	7.3	13.1	*89.3*	*55.7*	3.6	3.65	*98.6*	5.0	2.3	*46*
79.1	*78.2*	14.70	1,410	11.2	6.8	13.0	*86.2*	*52.3*	3.6	3.8	*94.7*	5.2	......	......
79.3	*77.9*	14.87	1,460	......	7.2	13.1	....	*55.0*	3.2	3.7	*86.5*	5.6	2.4	*42.9*
79.7	*79.5*	15.23	1,450	11.7	7.3	13.1	*89.3*	*55.7*	3.4	3.85	*88.3*	5.1	2.6	*51*
79.8	*77.5*	13.97	1,260	......	......	......	....	....	3.8	3.8	*100*	......	......	......
79.8	*79.1*	14.47	1,170	......	6.4	13.6	....	*47.1*	3.2	3.7	*86.5*	4.6	2.5	*54.4*
79.9	*79.9*	14.60	1,350	......	6.4	12.7	....	*50.4*	3.3	3.7	*89.2*	4.9	2.7	*55.1*
80.4	*74.3*	14.77	1,345	......	6.6	13.4	....	*49.2*	3.55	3.6	*98.6*	5.1	3.0	*58.8*
80.6	*78.2*	15.07	1,500	12.5	7.3	12.7	*98.4*	*57.5*	3.45	3.5	*98.6*	5.2	2.7	*51.9*
80.9	*76.7*	14.43	1,335	11.0	6.7	12.8	*85.7*	*52.3*	3.62	3.75	*96.7*	5.0	2.5	*50*
81.0	*80.0*	13.77	1,170	......	6.8	12.3	....	*55.3*	3.6	3.7	*97.3*	4.9	2.3	*46.9*
81.2	*79.2*	14.33	1,300	......	7.4	14.0	....	*52.9*	3.35	3.85	*87.0*	5.0	2.6	*46.4*
(*81.2*)	(*80.2*)	14.90	1,405	......	6.8	12.8	....	*53.1*	3.3	3.65	*90.4*	5.2	2.6	*50*
81.3	*77.0*	15.23	1,540	11.6	7.0	13.3	*87.2*	*52.6*	3.2	3.6	*88.9*	5.2	2.8	*53.8*
81.4	*77.9*	14.03	1,240	......	......	12.9	....	....	3.7	3.9	*94.9*	5.1	2.7	*52.9*
81.4	*75.6*	14.33	1,260	......	7.3	13.0	....	*56.2*	3.7	3.6	*102.8*	5.3	2.9	*54.7*
81.7	*81.8*	14.98	1,395	......	......	12.8	....	....	3.45	3.9	*88.5*	4.9	2.9	*59.2*
82.0	*75.3*	14.87	1,490	......	6.8	12.7	....	*53.5*	3.4	3.65	*93.2*	5.1	2.7	*52.9*
82.1	*85.6*	14.57	1,360	......	......	13.0	....	....	3.4	3.7	*91.9*	5.0	2.7	*54*
82.1	*77.9*	15.10	1,590	12.3	7.5	13.7	*89.8*	*54.7*	3.15	3.75	*84*	5.4	2.5	*46.3*
82.3	*79.0*	14.83	1,345	......	7.4	14.0	....	*52.9*	3.55	4.0	*88.8*	5.3	2.5	*47.2*
82.4	*82.6*	14.60	1,400	......	7.1	13.0	....	*54.6*	3.3	3.7	*89.2*	5.2	2.3	*44.2*
82.4	*82.6*	14.60	1,290	......	6.7	13.2	....	*50.7*	3.45	3.8	*90.8*	5.0	2.9	*58*
82.4	*81.0*	15.03	1,470	......	7.0	13.2	....	*53.0*	3.3	3.7	*89.2*	4.8	2.3	*47.9*
82.5	*81.7*	15.17	1,540	......	7.3	13.6	....	*53.7*	3.6	3.7	*97.3*	5.2	2.5	*48.1*
82.7	*78.5*	14.67	1,390	10.9	6.6	12.8	*85.2*	*51.5*	......	......	......	......	......	......
82.9	*78.6*	15.37	1,630	12.0	......	14.1	*85.1*	....	3.8	4.0	*95.0*	5.3	2.7	*50.9*
83	*79.6*	15.10	1,500	12.0	7.4	12.7	*94.5*	*58.3*	3.7	3.8	*97.4*	5.5	2.3	*41.8*
83.3	*75.8*	14.67	1,420	10.9	6.6	13.0	*83.9*	*50.8*	......	......	......	4.9	2.5	*51*
83.3	*76.4*	15.20	1,570	......	7.5	13.8	....	*54.4*	3.4	3.8	*89.5*	5.8	2.7	*46.6*
83.5	*78.6*	14.30	1,350	......	7.2	12.8	....	*56.2*	3.3	3.5	*94.3*	5.3	2.7	*50.9*
83.5	*78.8*	14.50	1,330	11.7	7.3	12.7	*92.1*	*57.5*	3.4	3.65	*93.2*	5.0	2.5	*50*
83.5	*80.1*	14.57	1,410	10.9	6.5	13.0	*83.8*	*50*	3.55	3.65	*97.3*	4.9	2.3	*46.9*
83.9	*84.1*	14.63	1,370	......	6.7	13.8	....	*48.5*	3.4	3.7	*91.9*	5.3	2.5	*47.2*
83.9	*75.6*	14.70	1,450	......	7.1	13.3	....	*53.4*	3.6	3.85	*93.5*	5.2	2.4	*46.2*
83.9	*77.3*	15.30	1,620	......	7.0	13.7	....	*51.1*	3.7	4.2	*88.1*	5.0	2.5	*50*
83.9	*76.2*	14.73	1,340	11.5	7.0	13.8	*83.3*	*50.7*	3.2	3.8	*84.2*	5.3	2.6	*49.1*
84.1	*80.5*	14.63	1,240	......	......	......	....	....	3.4	3.85	*88.3*	5.2	2.6	*50*
84.4	*83.1*	14.53	1,400	10.4	6.4	12.4	*83.9*	*51.6*	3.3	3.75	*88.0*	5.0	2.5	*50*
84.5	*85.2*	14.73	1,450	11.7	7.2	......	....	....	3.45	3.6	*95.8*	5.3	2.7	*50.9*
84.5	*77.3*	14.83	1,530	......	6.5	13.3	....	*48.9*	3.4	3.45	*98.6*	5.1	2.7	*52.9*
84.6	*80.6*	14.50	1,260	......	6.4	13.4	....	*47.8*	2.95	3.5	*84.3*	4.8	2.6	*54.2*
84.6	*84.3*	14.10	1,240	......	7.3	12.5	....	*58.4*	3.6	3.7	*97.3*	5.5	2.6	*47.3*
84.7	*78.8*	14.27	1,370	11.4	0.8	12.7	*89.8*	*53.5*	3.75	3.7	*101.4*	5.0	2.5	*50*

Mongolian crania—Continued.

FEMALE—Continued.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
278,908		Urga, Mongolia	Adult	Moderate occipital compression.	(17.2)	(14.6)	(12.6)
278,726		do	do		16.8	14.3	12.6
278,897		do	do		17.2	14.7	13.3
278,733		do	do		16.2	13.9	12.7
278,819		do	do		17.7	15.2	12.2
278,727		do	do		17.3	14.9	12.0
278,742		do	do		17.4	15.0	12.6
278,749		do	do		16.5	14.3	12.3
278,750		do	do		16.5	14.4	12.5
278,738		do	do		16.6	14.7	12.3
278,858		do	do		17.4	15.4	11.8
278,764		do	Very near adult.		16.5	14.7	13.0
278,752		do	Adult	Slight occipital compression.	16.8	15.1	12.0
278,762		do	do		17.2	15.5	12.4
278,753		do	do	Very slight asymmetry.	16.5	15.0	12.6
278,763		do	do	Slight occipital compression.	16.7	15.2	13.0
278,925		do	do		16.5	15.4	12.0
Total					(73) 1,267.4	(73) 1,044.9	(73) 914.5
Average					*17.36*	*14.31*	*12.53*

Buriats: Siberian crania.

MALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
283,616	A. Hrdlička	Kiahta, Orkhon River.	Adult	Slight asymmetry.	18.7	14.0	13.3
283,607			do		18.6	14.2	12.9
283,614			do		18.4	14.2	13.7
283,605			do		18.0	13.9	13.0
283,620			do		19.0	15.0	13.1
278,707			do		17.9	14.4	13.2
283,608			do		18.0	14.5	12.8
278,716			do		18.4	15.2	12.8
283,613			do		18.2	15.3	13.8
278,701			do		17.7	14.9	13.6
283,615			do		17.3	14.6	12.9
283,604			do		18.0	15.2	12.9
283,621			do		17.6	14.9	......
278,705			do		18.1	15.4	12.8
278,706			do		17.6	15.0	12.4
278,711			do		17.6	15.2	12.8
283,612			do		17.2	15.0	12.7
283,609			do		17.6	15.4	12.8
278,710			do	Very slight asymmetry.	18.5	15.2	13.8
Total					(19) 342.4	(19) 282.5	(18) 235.3
Average					*18.02*	*14.87*	*13.07*

Mongolian crania—Continued.

FEMALE—Continued.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, height.	Nose Breadth, maxim.	*Nasal Index.*
(*84.9*)	(*79.2*)	14.80	1,370	......	7.3	13.7	....	*53.2*	3.45	3.9	*88.5*	5.3	2.8	*52.8*
85.1	*81.0*	14.57	1,360	11.6	7.9	13.3	*87.2*	*59.4*	3.6	3.95	*91.2*	5.7	2.8	*49.1*
85.5	*83.4*	15.07	1,550	......	7.4	13.8	....	*53.6*	3.5	3.6	*97.2*	5.6	2.4	*42.9*
85.8	*84.4*	14.27	1,270	......	6.4	12.9	....	*49.6*	3.25	3.5	*92.9*	4.9	2.4	*49*
85.9	*74.2*	15.03	1,500	......	7.2	13.5	....	*53.4*	3.5	3.8	*92.1*	5.3	2.5	*47.2*
86.1	*74.5*	14.73	1,460	......	6.8	12.7	....	*53.5*	3.58	3.6	*99.4*	5.3	2.4	*45.3*
86.2	*77.8*	15.00	1,480	......	7.2	13.3	....	*54.1*	3.75	3.8	*98.7*	5.3	2.5	*47.2*
86.7	*79.9*	14.37	1,400	......	6.6	12.4	....	*53.2*	3.2	3.5	*91.4*	4.9	2.3	*46.9*
87.3	*80.9*	14.47	1,365	10.9	6.7	12.6	*86.5*	*53.2*	3.6	3.75	*96.0*	5.0	2.8	*56*
88.5	*78.6*	14.53	1,330	......	6.8	13.8	....	*49.3*	3.4	3.8	*89.5*	5.5	2.8	*50.9*
88.5	*72.0*	14.87	1,470	......	6.7	13.1	....	*51.1*	3.6	3.7	*97.3*	5.3	2.4	*45.3*
89.1	*83.3*	14.73	1,440	10.5	6.6	12.8	*82*	*51.6*	3.3	3.8	*86.8*	4.7	2.3	*48.9*
89.9	*75.2*	14.63	1,400	......	6.5	12.9	....	*50.4*	3.12	3.6	*86.7*	4.9	2.5	*51*
90.1	*75.8*	15.03	1,510	......	7.1	13.5	....	*52.6*	3.45	3.7	*93.2*	5.3	2.4	*45.3*
90.9	*80.0*	14.70	1,410	......	6.6	13.4	....	*49.2*	3.5	3.7	*94.6*	4.7	2.6	*55.3*
91.0	*81.5*	14.97	1,430	12.6	7.8	13.6	*92.6*	*57.4*	3.55	3.6	*98.6*	5.5	2.5	*45.4*
93.3	*75.2*	14.63	1,460	......	7.0	14.4	....	*48.6*	3.8	3.9	*97.4*	5.7	2.5	*43.9*
(*75*) *82.4*	(*75*) *79.1*	(75) *14.73*	(74) 104,065 *1,406*	(26) 297 *11.42*	(64) 453.7 *7.09*	(69) 907.8 *13.16*	(*25*) *87.7*	(*63*) *53.1*	(73) 254.12 *3.48*	(73) 272.85 *3.74*	(*73*) *93.1*	(73) 378.8 *5.19*	(72) 184.7 *2.56*	(*72*) *49.4*

Buriats: Siberian crania.

MALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol. Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index, total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
74.9	*81.4*	15.33	1,510	......	7.3	13.7	....	*53.4*	3.45	3.85	*89.6*	5.3	2.7	*50.9*
76.3	*78.7*	15.23	1,590	......	......	14.3	....	....	3.5	4.02	*87.1*	5.2	2.8	*53.8*
77.2	*84*	15.43	1,605	......	7.3	......	....	....	3.3	3.5	*94.3*	5.3	2.6	*49.1*
77.9	*81.5*	14.97	1,520	13.2	8.0	13.6	*97.1*	*58.8*	3.5	3.7	*94.6*	5.9	2.6	*44.1*
79.0	*77.1*	15.70	1,650	......	7.3	13.8	....	*52.9*	3.45	3.7	*93.2*	5.3	2.7	*50.9*
80.4	*81.7*	15.17	1,490	11.5	......	13.6	*84.6*	....	3.25	3.8	*85.5*	4.9	2.6	*53.1*
80.6	*78.6*	15.10	1,545	......	7.3	13.4	....	*54.5*	3.3	3.6	*91.7*	5.7	2.5	*43.9*
82.0	*76.2*	15.47	1,560	12.3	7.7	14.3	*86.0*	*53.8*	3.5	3.7	*94.6*	5.8	2.7	*46.6*
84.1	*82.4*	15.77	1,640	12.5	7.5	14.3	*87.4*	*52.4*	3.65	4.05	*90.1*	5.6	2.6	*46.4*
84.2	*85.4*	15.40	1,540	......	7.3	13.4	....	*54.5*	3.15	3.8	*82.9*	5.2	2.7	*51.9*
84.4	*80.9*	14.93	1,570	13.4	8.0	13.5	*99.3*	*59.3*	3.6	3.8	*94.7*	5.5	2.6	*47.3*
84.4	*77.7*	15.37	1,490	......	8.0	14.3	....	*55.9*	3.4	4.0	*85*	6.1	3.0	*49.2*
84.7	......	......	......	......	......	......	....	....	......	......	....	......	......	......
85.1	*76.4*	15.43	1,500	......	......	13.5	....	....	3.2	3.68	*87*	5.4	2.7	*50*
85.2	*76.1*	15.00	1,470	12.7	7.5	13.7	*92.7*	*54.7*	3.8	3.8	*100*	5.5	2.75	*50*
86.4	*78.0*	15.20	1,450	12.1	7.8	14.8	*81.8*	*52.7*	3.6	3.85	*93.5*	5.8	2.8	*48.3*
87.3	*78.9*	14.97	1,500	......	7.5	14.1	....	*53.2*	3.42	3.55	*96.3*	5.5	2.5	*45.4*
87.5	*77.6*	15.27	1,520	13.4	8.0	14.6	*91.8*	*54.8*	3.52	3.9	*90.3*	5.7	2.5	*43.9*
87.6	*79.5*	16.17	(1,915)	......	7.0	13.5	....	*51.8*	3.15	3.55	*88.8*	5.3	2.9	*54.7*
(*19*) *83.5*	(*18*) *79.4*	(18) *15.33*	(17) 26,140 *1,538*	(8) 101.1 *12.63*	(15) 113.5 *7.56*	(17) 236.4 *13.90*	(*8*) *89.9*	(*14*) *54.5*	(18) 61.74 *3.43*	(18) 67.85 *3.76*	(*18*) *91*	(18) 99 *5.50*	(18) 48.25 *2.68*	(*18*) *48.7*

Buriats; Siberian crania—Continued.

FEMALE.

Catalogue No.	Collection.	Locality.	Approximate age of subject.	Deformation.	Diam. antero-posterior maxim. (glabella ad maximum).	Diam. lateral maxim.	Basion-Bregma height.
278,704	A. Hrdlička	Orkhon River, north of Kiahta.	Adult		18.1	14.2	13.2
283,625			do		17.6	13.8	
278,708			do		17.8	14	13.4
278,709			do		17.8	14.4	12.2
283,602			do		17.2	14.1	12.6
283,611			do		17.9	14.7	12.4
283,610			do		17.3	14.2	12.4
283,619			do		16.8	13.9	12.2
283,617			do		16.4	13.7	12.8
278,703			do		17.4	14.7	12.2
283,601			do	Moderate occipital compression.	(17.4)	(15)	(12.4)
278,702			do		17.7	15.3	12.3
278,712			do		17.0	14.8	12.3
283,603			do		17.0	15.1	12.4
					(14)	(14)	(13)
Total					244	201.3	163.6
Average					*17.40*	*14.30*	*12.60*

Buriats: Siberian crania—Continued.

FEMALE.

Cranial Index.	*Mean Height Index.*	Cranial Module.	Capacity, in c. c. (Hrdlička's method).	Menton-Nasion Height (a).	Alveol Pt.-Nasion Height (b).	Diam. Bizygomatic maxim. (c).	*Facial Index total* $\left(\frac{a\times100}{c}\right)$	*Facial Index, upper* $\left(\frac{b\times100}{c}\right)$	Orbits—Height, mean.	Orbits—Breadth, mean.	*Orbital Index, mean.*	Nose, Height.	Nose Breadth, maxim.	*Nasal Index.*
78.4	*81.7*	15.17	1,510	10.9	7.3	13.1	*83.2*	*55.7*	3.3	3.45	*95.7*	5.3	2.0	*49.1*
78.4	......	......	......	......	......	......	......	......	......	......	......	......	......	......
78.6	*84.3*	15.07	1,400	11.2	6.9	13.9	*80.6*	*49.6*	3.4	3.8	*89.5*	5.2	2.4	*46.2*
80.9	*75.8*	14.80	1,335	......	......	13.4	......	......	3.6	3.55	*101.4*	5.3	2.6	*49.1*
82	*80.5*	14.67	1,340	......	7.7	13.9	......	*55.4*	3.65	3.9	*96.1*	5.8	2.7	*46.6*
82.1	*76.1*	15.00	1,350	......	......	......	......	......	......	......	......	......	......	......
82.1	*78.7*	14.63	1,370	......	6.5	13.0	......	*50*	3.3	3.7	*89.2*	4.8	2.3	*47.9*
82.7	*79.5*	14.30	1,300	......	6.8	......	......	......	3.3	3.55	*93*	5.2	2.4	*46.2*
83.5	*85*	14.30	1,210	......	6.9	12.8	......	*53.9*	3.25	3.55	*91.6*	5.1	2.6	*51*
84.5	*76*	14.77	1,470	12.3	7.6	13.3	*92.5*	*57.1*	3.55	3.9	*91.0*	5.5	2.6	*47.3*
......	......	14.93	1,410	......	6.9	13.4	......	*51.5*	3.4	3.65	*93.2*	5.1	2.5	*49*
86.4	*74.6*	15.10	1,415	......	7.8	13.9	......	*56.1*	3.5	3.75	*96.4*	5.8	2.8	*48.3*
87.1	*77.4*	14.70	1,350	......	7.2	14.3	......	*50.4*	3.6	4.1	*87.8*	5.4	2.9	*53.7*
88.8	*77.3*	14.83	1,500	......	7.3	14.0	......	*52.2*	3.6	3.7	*97.3*	5.2	2.5	*48.1*
(*14*)	(*13*)	(13)	(13)	(3)	(12)	(12)	(*5*)	(*11*)	(13)	(13)	(*13*)	(13)	(13)	(*13*)
......	......	......	17,960	34.4	86.1	162	......	......	45.1	48.4	......	69	33.4	......
82.5	*79.1*	*14.81*	*1,381*	*11.46*	*7.17*	*13.50*	*85.4*	*53.4*	*3.47*	*3.72*	*93.2*	*5.30*	*2.56*	*48.4*

Mongolian and Buriat crania—Summary of measurements contrasted with Alaskans and Athapascans, and with westernmost Eskimo.

	Male.				Female.			
	Mongols.	Buriats.	Alaskan and Athapascan.[1]	St. Lawrence Island Eskimo.	Mongols.	Buriats.	Alaskan and Athapascan.[1]	St. Lawrence Island Eskimo.
Number of skulls	(114)	(19)	(61)	(158)	(73)	(14)	(48)	(87)
Vault:								
Length	18.40	18.02	18.12	18.40	17.36	17.40	17.26	17.63
Breadth	15.01	14.87	14.88	14.14	14.31	14.30	14.40	13.65
Height	13.10	13.07	13.03	13.70	12.53	12.50	12.43	13.20
Cranial Index	*81.4*	*82.5*	*82.1*	*76.9*	*82.4*	*82.5*	*83.4*	*77.4*
Mean Height Index	*78.4*	*79.4*	*79.6*	*84.2*	*79.1*	*79.1*	*78.5*	*84.9*
Module	15.51	15.33	15.43	15.42	14.73	14.81	14.66	14.77
Capacity	1,573	1,538	1,529	1,506	1,406	1,391	1,355	1,364
Face:								
M.-N. Height	12.58	12.63	12.03	12.70	11.42	11.46	11.53	11.37
Alv. Pt.-N. Height	7.76	7.56	7.41	7.66	7.09	7.17	6.98	7.03
Breadth	14.20	13.90	14.45	14.08	13.16	13.50	13.33	13.20
Facial Index:								
Total	*88.8*	*89.9*	*83.4*	*90.2*	*87.7*	*85.4*	*86.3*	*86.4*
Upper	*54.5*	*54.5*	*51.1*	*54.5*	*53.1*	*53.4*	*52.3*	*53.4*
Orbits:								
Mean height	3.59	3.43	3.50	3.69	3.48	3.47	3.53	3.60
Mean breadth	3.93	3.76	4	4.04	3.74	3.72	3.82	3.92
Mean Index	*91.5*	*91*	*89.8*	*91.3*	*93.1*	*93.2*	*92.5*	*91.8*
Nose:								
Height	5.66	5.50	5.31	5.54	5.19	5.30	5	5.12
Breadth	2.75	2.68	2.60	2.47	2.56	2.56	2.42	2.40
Index	*48.6*	*48.7*	*48.9*	*44.6*	*49.4*	*48.4*	*48.4*	*46.80*

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[1] It is self-understood that the means of this column are only means employed for convenience of comparison.

NOTES ON THE ASIATIC CRANIA AND ON THEIR RELATION TO THE ALASKANS, ATHAPASCANS, AND ESKIMO.

1. The Mongols and Buriats are shown to be identical.

2. Both are characterized, on the average, by moderate brachycephaly, low vault of the skull, rather high and only moderately broad face giving high facial indices, slightly megaseme orbits, and mesorhinic nose.

3. Contrasting the Eskimo with the Mongolian cranial type, the former shows narrower and higher vault, about the same size of skull and cranial cavity, almost the same facial and orbital dimensions and indices, but a narrower nose. The derivation of the Eskimo type from one like the Mongolian appears quite evident.

The only marked difference between the Alaskan and Athapascan Indians and the Mongolian type is that of the face, which in the Indians is broader and gives on that account lower facial indices. But this is without much doubt a functional modification due, it seems, to a greater development in the Indians of the muscles of mastication and is very nearly limited to the males; the females of the two types are almost identical.

4. The important physical relations between the type of the Alaskan and Athapascan Indians and that of the Mongolians point not only to a common parentage but also to a relatively recent derivation from Asia of the Indian groups under consideration.

5. The highly important feature of low vault is known to be common to other Mongolic peoples in Asia besides those here considered, as, for instance, the Kalmuks, the Turguts, etc., and it will be shown to extend to some noteworthy groups of Indians both in North and South America.

DESCRIPTIONS OF NEW AMERICAN AND CHINESE SPIDERS, WITH NOTES ON OTHER CHINESE SPECIES.

By Ralph V. Chamberlin,

Of the Museum of Comparative Zoology, Cambridge, Massachusetts.

In this paper are described a number of new species of spiders recently noted by the author while identifying material in the United States National Museum and in the Museum of Comparative Zoology, and notes are given upon a collection from China belonging to the former institution. This collection was made by Mr. N. Gist Gee, chiefly in the Province of Fokien at Foochau, Kuliang, Kucheng, and Kushan, and in the Province of Kiangsu at Nanking and Soochow, the greater number coming from the latter place. The new Chinese species described form part of this collection, while the new North American forms were found mostly in a collection made in Louisiana by Mr. H. Edward Hubert, of New Orleans.

Following is a complete list of the species occurring in the collection from China, each species being more particularly noted later on under its proper family:

CHINESE SPIDERS COLLECTED BY N. GIST GEE.

Uloborus, species.
Psechrus mimus, new species.
Loxosceles rufescens (Dufour).
Scytodes nigrolineata (Simon).
Scytodes thoracica (Latreille).
Gnaphosa suchuana, new species.
Selenops bursarius Karsch.
Crossopriza lyoni (Blackwall).
Pholcus opilionoides (Schranck).
Theridion tepidariorum C. Koch.
Argyrodes bonadea (Karsch.)
Argyrodes fur Bösenberg and Strand.
Ariamnes flagellum (Doleschall).
Tetragnatha conformans, new species.
Tetragnatha sociella, new species.
Tetragnatha, species.
Tetragnatha plena, new species.
Tetragnatha retinens, new species.
Tetragnatha oliens, new species.
Eucta chinensis, new species.
Leucauge retracta, new species.
Leucauge veterascens, new species.
Nesticus alteratus, new species.
Nephila clavata L. Koch.
Argiope amoena L. Koch.
Argiope viabilior, new species.
Argiope aequior, new species.
Miranda zabonika, new species.
Aranea multiplicans, new species.
Aranea fratrella, new species.
Aranea pia, new species.
Aranea quadrata (Clerck).
Aranea sericata (Clerck).
Chinestela gisti, new species.
Gasteracantha nabona, new species.
Philodromus amitinus, new species.
Agelena labyrinthica (Linnaeus).
Tegenaria, species.
Coelotes kulianganus, new species.
Dolomedes insurgens, new species.

Dolomedes chinesus, new species.
Lycosa pseudoannulata (Bösenburg and Strand).
Orinocosa oriens, new species.
Pardosa laura (Karsch).
Pardosa astrigera L. Koch.
Oxyopes sertatus L. Koch.
Hyllus mimus, new species.

Family ULOBORIDAE.

ULOBORUS, species.

One immature male in the collection too young for specific identification.

Locality.—China: Soochow.

Family PSECHRIDAE.

PSECHRUS MIMUS, new species.

Carapace yellow, with darker marginal line not passing over pars cephalica and a darker area along upper part of pars cephalica and nearly covering the carapace dorsally. Eyes on black. Sternum light brown, with a large median dark area enclosing a light spot anteriorly. Legs yellow, with broad black annuli excepting on the metatarsi and tarsi, which are not ringed. The abdomen dorsally is silver-colored from a dense coat of hair of that color, the sides dark, either nearly uniform and not spotted, or with a few small and scattered dark spots; the venter yellow excepting for the usual median ventral white line which extends from the anterior end to a spot some distance in front of the cribellum.

This species resembles *P. alticeps* Pocock and differs from other Indo-Asiatic species in having the cephalic region elevated and the eyes prominent. It differs from *P. alticeps* in its somewhat smaller size and in the proportionately shorter legs, the first pair being about 6.4 times as long as the cephalothorax as against 8 times in *alticeps*.

Length, 12 mm.; cephalothorax, 5 mm.; total length of leg I, 32 mm.; tibia and patella I,[1] 11 mm.; tibia and patella IV, 8.5 mm.

Location.—China: Soochow (N. Gist Gee). Three specimens.

Type.—Cat. No. 868, U.S.N.M.

Family DICTYNIDAE.

PARAUXIMUS AUSTINENSIS, new species.

Female.—Carapace, sternum, legs, labrum, and endites light yellowish brown. Chelicerae chestnut. Abdomen yellowish gray, without distinct markings.

Lower margin of furrow of chelicera having seven teeth, which decrease in size from the distal one proximad.

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[1] Roman numerals used in connection with the length of tibia and patella refer to the pairs of legs, counting from the anterior.

Anterior row of eyes procurved; median eyes much smaller than the laterals, the diameters being to each other as 7:12; median eyes very nearly their radius from the laterals and a little nearer to each other. Posterior row of eyes a little procurved; eyes equidistant, separated from each other by a distance equal to the diameter of a median eye; median eyes a little smaller than the laterals, the diameters being to each other as 5:6. Lateral eyes on each side separated by less than half a radius, the anterior and posterior eyes equal. Clypeus much higher than the diameter of an anterior lateral eye.

Tibia I armed beneath with two pairs of stout spines and with two spines on anterior surface.

Length, 8 mm.; cephalothorax, 4.2 mm.; tibia and patella I, 4.2 mm.; tibia and patella IV, 4.2 mm.

Locality.—Texas: Austin. R. V. Chamberlin, August, 1909.

Type.—Cat. No. 572, M. C. Z.

This species is referred to *Parauximus* with a little doubt, since the genotype is known only from the male and the present species only from the female, but the reference will probably be found correct. It differs from *Auximus* in its higher clypeus and the more numerous teeth of the margin of the chelicera. It may be noted that the two species described by the author under *Auximus* in[2] 1919 were inadvertently listed in this genus instead of in *Amaurobius*, to which they in reality belong.

Family SCYTODIDAE.

LOXOSCELES RUFESCENS (Dufour).

Scytodes rufescens DUFOUR, Ann. Sci. Pys., 1820, vol. 4, p. 203, pl. 77, fig. 5.

Locality.—China: Soochow (N. Gist Gee). Two specimens.

SCYTODES NIGROLINEATA (Simon).

Dictia nigrolineata SIMON, Ann. Soc. Ent. France, 1880, ser. 5, vol. 10, p. 123.

Locality.—China: Kucheng (N. Gist Gee). One male taken in a house at an elevation of 2,000 feet.

SCYTODES THORACICA (Latreille).

Aranea thoracica LATREILLE, Nouv. Dict. d'Hist. Nat., 1884, vol. 24, p. 134.

Locality.—China: Soochow (N. Gist Gee). One female taken in a house.

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[2] Journ. Ent. and Zool., 1919, p. 3.

Family GNAPHOSIDAE.

GNAPHOSA SUCHUANA, new species.

Plate 1, fig. 1.

Female.—Carapace dusky over a light brown ground, excepting the middle region of pars cephalica, which is clear. Sternum light brown. Legs slightly dusky over brown, without annuli or other markings. Abdomen dusky grey, the middorsal region without distinct marking.

This species is aparently near to *G. sinensis* Simon, known from the environs of Pekin, but may readily be distinguished by differences in spining of legs as well as by the different form of the epigynum. Metatarsi I and II have each a single pair of stout ventral spines which are between the middle and the base, though there is, in addition, a pair of black stout setae at the distal end which possibly represent reduced terminal spines. The tibiae I and II are armed beneath with two pairs of spines, one pair at distal end, the other a little distad of the middle.

The epigynum is obviously broader than described and figured for *sinensis.* The median piece broader and shorter.

Length, 8.5 mm.

Locality.—China: Kuliang (N. Gist Gee). Two females taken in low grass among stones.

Type.—Cat. No. 864, U.S.N.M.

Family CLUBIONIDAE.

SELENOPS BURSARIUS Karsch.

Selenops bursarius KARSCH, Verh. Ver. Rheinl., 1879, vol. 36, p. 81, pl. 1, fig. 12.

Locality.—China: Soochow (N. Gist Gee). One immature male taken in a house, October 1.

Family PHOLCIDAE.

CROSSOPRIZA LYONI (Blackwall).

Pholcus lyoni BLACKWALL, Ann. Mag. Nat. Hist., ser. 3, 1867, vol. 19, p. 392.

Locality.—China: Foochow (N. Gist Gee). One specimen taken August 30.

A species common in India and eastward as far as Burma. It occurs frequently in houses.

PHOLCUS OPILIONOIDES (Schranck).

Aranea opilionoides SCHRANCK, Enum. Ins. Austr., 1788, p. 530.

Locality.—China: Soochow (N. Gist Gee). One specimen taken in a house, September 26.

Family THERIDIIDAE.

THERIDION TEPIDARIORUM C. Koch.

Theridion tepidariorum KOCH, Die Arachniden, 1841, vol. 8, p. 75, figs. 647–648.

Locality.—China: Soochow; Kushan, 2,500 feet (N. Gist Gee). Seven specimens.

ARGYRODES BONADEA (Karsch).

Conopistha Bona Dea KARSCH, Bull. Ent. Teitschl., 1881, vol. 25, p. 39.

Locality.—China: Soochow (N. Gist Gee). One male.

ARGYRODES FUR Bösenberg and Strand.

Argyrodes fur BÖSENBERG and STRAND, Abh. Senckenb. Naturf. Ges., 1909, vol. 30, p. 133, pl. 2, fig. 226.

Locality.—China: Foochow (N. Gist Gee). Two females, a male, and numerous immature specimens taken on an old tree.

The note states that a pair were usually found together in the same web. A cocoon accompanying the specimens, and from which the young appear to have emerged, is of membranous texture, spherical in form, with a slender attachment thread at one side and an opening at the end of a tubular protrusion at the other.

ARGYRODES BICLAVIS, new species.

Plate 1, figs. 2–5.

Male.—Carapace dusky brown, the sternum darker. Legs in general yellow, the joints of the anterior pairs dusky or blackish at distal ends, particularly in the case of the femora and tibiae of the first pair. Abdomen above with a median longitudinal dusky or blackish stripe which continues down caudal end to spinnerets, broadening caudad; on each side of this stripe shining silver-colored. Sides and venter in front of the silvery area from dorsum dark, brown and blackish.

Cephalothorax with a straight process from clypeus, which is thicker at base than distally, where it is rounded. Just above the clypeal process the head is extended in a process which is slender at base and expands distally into a rounded, knoblike form, this end resting against the upper surface of the end of the clypeal process (pl. 1, figs. 2, 3). This clavate upper process bears the median eyes, of which the anterior are much more widely separated than the posterior, the latter being more than the diameter of an eye apart.

Abdomen with the dorsal line in profile nearly horizontal; the spinnerets born directly below; the caudal end rounded (pl. 1, fig. 4).

Palpus as shown in Plate 1, figure 5.

Length, 2.6 mm.; cephalothorax (including rostrum), 1.4 mm.; tibia and patella I, 2.2 mm.; tibia and patella IV, 0.9 mm.

Locality.—Louisiana: Aimesville. One male.

Type.—Cat. No. 564, M. C. Z.

ARIAMNES FLAGELLUM (Doleschall).

Ariadne flagellum DOLESCHALL, Batavia Nat. Tidjich., 1857, vol. 13, p. 411.

Locality.—China: Soochow (N. Gist Gee). One specimen.

A species widespread in the Indo-Malaysian region and also occurring in Australia.

Family LINYPHIIDAE.

ANIBONTES, new genus.

Cephalothorax long, narrowed from the middle caudad, not margined. Clypeus exceeding in height the length of the median ocular area. Clypeus and sides of head sloping. Sternum longer than broad, acutely pointed behind. Chelicerae of male long and divaricate, the outer face with a series of teeth much as in species of *Erigone*. Legs rather short. Tibia and more proximal joints of male palpus without processes.

Genotype.—*Anibontes mimus*, new species.

This genus differs from *Microneta* particularly in its caudally narrowed cephalothorax, which gives the individual a typically antlike appearance, and in the armature of the chelicerae of the male.

ANIBONTES MIMUS, new species.

Plate 1, figs. 6, 7; plate 2, fig. 8.

Male.—Cephalothorax conspicuously narrowed from the middle caudad and obviously narrower at the caudal end than at the anterior (pl. 2, fig. 8). Clypeus depressed beneath the eyes and sloping forward.

Anterior row of eyes nearly straight, slightly recurved; median eyes nearer to each other than to the laterals. Posterior row of eyes straight, or very nearly so; median eyes less than their diameter apart, farther from the laterals. Area of median eyes considerably longer than wide; only slightly narrower in front than behind.

Chelicerae in the male distally strongly narrowed or excavated; the claw long; upper margin of furrow with four teeth widely removed from the base of the claw. Proximad of the narrowed distal portion, the chelicera bulges convexly in front and laterally, and along the anterolateral line bears a series of five short spines or teeth, of which the more distal ones are curved (pl. 1, fig. 6).

Carapace and sternum dusky over fulvous, almost black, the labium, endites, and chelicerae also dark. Legs more yellowish and less dusky. Abdomen blackish, with a transverse white band across middle above and laterally, but the band absent or vague ventrally.

Palpus as shown in Plate 1, figure 7.

Length, 2 mm.; cephalothorax, 1 mm.; greatest width of cephalothorax, 6 mm.

Locality.—Louisiana: New Orleans. One male taken in house in June.

Type.—Cat. No. 569, M. C. Z.

BATHYPHANTES ERYTHROIDES, new species.

Plate 2, fig. 9.

Female.—Carapace, sternum, and legs from base to middle of femora light orange. Legs distad of middle of femora black or nearly so. The abdomen reddish, without distinct markings.

Clypeus vertical or very nearly so. Posterior row of eyes a little procurved; median eyes more than their diameter from the laterals, nearer to the latter than to each other. Anterior row of eyes nearly straight, a little procurved; median eyes smaller than the laterals, about their diameter apart and nearly twice as far from the laterals. Lateral eyes prominent.

Epigynum as shown in Plate 2, figure 9.

Length, 2.5 mm.; cephalothorax, 1 mm.; tibia and patella I, 1.45 mm.; tibia and patella IV, 1.3 mm.

Locality.—Louisiana: Talisheek. One female.

Type.—Cat. No. 568, M. C. Z.

GRAPHOMOA, new genus.

Cephalothorax short, narrowed forward, the frons narrow and wholly crossed by the eye-area. Clypeus depressed beneath the anterior eyes, about equal in height to the length of the median eye-area. Anterior row of eyes a little recurved; eyes nearly equal and equidistant, near together. Posterior row of eyes straight or but little procurved; eyes nearly equal and equidistant, typically less than their diameter apart. Lateral eyes nearly contiguous, protruding as in *Maso*. Chelicerae with both margins dentate, much as, for instance, in species of *Gongylidiellum*. Sternum broad, cordate, produced and inflexed between posterior coxae nearly as usual in *Maso*. Legs long and distally slender; the tarsi much shorter than the metatarsi; metatarsi somewhat longer than the tibiae; claws smooth. Abdomen high, not scutate.

Genotype.—*Graphomoa theridioides*, new species.

GRAPHOMOA THERIDIOIDES, new species.

Plate 2, figs. 10–12.

Female.—Carapace dusky or black, with a light spot on each side of caudal end of pars cephalica but with no other markings. Sternum also nearly black. Endites, labium, and chelicerae less densely dusky. Legs pale, deeply ringed with black; on first and second femora three rings of black, one at each end and one distad of middle; on posterior femora these rings less developed, represented by spots or sometimes not at all on the ends; patellae mostly blackish; tibiae and metatarsi with two black annuli, one at distal end and one at or proximad of middle; tarsi pale only proximally; a dark spot beneath on each coxa.

Posterior row of eyes very slightly procurved; eyes nearly equal and equidistant, less than the diameter of an eye (about four-fifths) apart. Anterior row of eyes a little recurved; equal and equidistant, about their radius apart; protruding forward over clypeus. Area of median eyes longer than wide behind, and wider behind than in front in ratio 7:6. Height of clypeus scarcely less than length of median eye-area. Abdomen above black with white markings; in front of middle four white spots arranged in a quadrangle; below these spots on each side a longitudinal white line, these lateral white lines united across dorsum in front of spinnerets; on each side a second line below the previously mentioned one; venter with a pair of minute white spots caudad of middle.

Chelicerae transversely striate on outer face, and bearing above some minute spinous points; upper margin of furrow with four teeth of which the two proximal ones are much larger than the other two; the lower margin with five small and equal teeth.

Sternum broad, subcordate; caudal end moderately narrowly extended between last coxae and reflexed, truncate at tip much as in *Maso* and some species of *Gongylidiellum*.

Legs long and slender; metatarsi much longer than the tarsi (pl. 2, fig. 10).

Epigynum represented in Plate 2, figure 12.

Length, 1.8 mm.; cephalothorax, 0.8 mm.; tibia and patella I, 1 mm.; tibia and patella IV, 0.8 mm.

Locality.—Louisiana: Aimesville. One female taken June 25, 1921.

Type.—Cat. No. 567, M. C. Z.

CERATICELUS NUBILICEPS, new species.

Plate 2, fig. 16.

Male.—Carapace and sternum fulvous, in general weakly dusky but the anterior portion of the pars cephalica black or nearly so, the clypeus below this pale, like the pars thoracica. Tarsi proximally yellow, the tarsus blackish. Legs yellowish. Abdomen pale yellow excepting the dorsal and ventral plate, which are dark fulvous or orange colored.

Anterior portion of pars cephalica elevated, evenly rounded, protruding conspicuously forward over lower part of clypeus, the latter high. Posterior row of eyes recurved, the median eyes nearer to the lateral eyes than to each other. Anterior row of eyes a little recurved; median eyes smaller than the laterals and much nearer to each other than to the latter.

Dorsal sclerite of abdomen covering the anterior two-thirds of dorsum. Epigastric sclerite well separated from the dorsal sclerite anteriorly.

Palpus of male as shown in Plate 2, figure 16.

Length, 1.9 mm.; cephalothorax, 0.8 mm.; tibia and patella I, 0.52 mm.; tibia and patella IV, 0.56 mm.

Locality.—Louisiana: New Orleans. One male.

Type.—Cat. No. 567, M.C. Z.

Family ARGIOPIDAE.

TETRAGNATHA CONFORMANS, new species.

Plate 2, figs. 13–15.

Female.—Carapace brown. Sternum darker brown, or more or less dusky, the labium blackish. Legs brown, the joints, especially the tibiae, darkened at extreme distal ends. Abdomen silvery colored above, with the usual median dorsal dark line from which branch and anastamose finer dark lines. Sides and venter of abdomen dark, black or nearly so.

Ocular quadrangle slightly narrower in front than behind.

Mandibles outstanding and diverging, as long as cephalothorax. Claw long and somewhat sinuous, untoothed. Upper margin of furrow bearing a series of seven teeth, of which the most distal, which is well toward middle of length of mandible, is longest, the others decreasing proximad; at distal end a single large black tooth against base of fang. Along ventral margin of furrow at distal end a large, straight, apically black tooth, and proximad of this a series of nine smaller teeth, decreasing in size proximad, the distal ones more widely separated than the others. See further, Plate 2, figure 13.

Abdomen widest in front, narrowing conspicuously caudad, at caudal end projecting a little beyond the spinnerets and at interior end projecting in the usual manner over the cephalothorax.

Male.—Coloration as in the female.

Mandible in side view clavately widening distad and then narrowing again a little at distal end. Toward distal end above with a single large spine which curves distad. Upper margin with a small tooth at distal end, a larger one a little proximad of this, and these followed proximad at an interval by a still longer tooth, proximad of which is a series of four well-spaced smaller, and paler teeth. The lower margin of furrow with a stout dark tooth at distal end having on ectal side its base a smaller blunt or somewhat nodular tooth; proximad of this a series of 10 or 11 teeth, of which the most proximal are much reduced in size. See further, Plate 2, figure 14.

The palpal organ as shown in Plate 2, figure 15.

Length of female, 9.2 mm.; abdomen, 8 mm.; chelicerae 2.5 mm.; tibia and patella I, 9.4 mm.; tibia and patella IV, 4.5 mm.

Length of male, 7.5 mm.; tibia and patella I, 9.8 mm.

Locality.—China: Kuliang (N. Gist Gee). One male, one female.

Type.—Cat No. 865, U.S.N.M.

TETRAGNATHA SOCIELLA, new species.

Plate 3, fig. 17.

Female.—Carapace somewhat darker than in the preceding species, with a dark Y-shaped mark formed by lines along side of pars cephalica, uniting at middle line of pars thoracica. Legs testaceous, joints darkened at distal ends, but with a band at the extreme end lighter. Abdomen with the usual dark lines above. Dorsum on each side limited by a wavy dark line separating off a narrow and correspondingly wavy light stripe on each side, the sides below this dark. Venter paler than sides, but somewhat dusky, with a clearer line on each side.

Area of median eyes narrower in front than behind. The lateral eyes on each side more widely separated from each other than are the corresponding medians.

The mandibles differ conspicuously from those of *conformans* and the species hereafter described in having an angular projection, or tooth, on the distal surface of the fang near its base, much as in *T. praedonia* Koch. On the ventral side at distal end two stout teeth, of which the proximal is the smaller. Proximad of these teeth on lower margin of furrow a tooth with characteristic dark body on distal side of base, from which it appears to arise. Proximad of this tooth seven others decreasing in size proximad. At distal end above a stout dark tooth with a minute one ectad of it. Along dorsal edge of furrow proximad of this a series of six teeth of which the second is the largest, the others decreasing gradually proximad from this. See Plate 3, figure 17.

The epigynum is very similar to that of *T. squamata* Karsch (pl. 3, fig. 17).

Length, 10.5 mm.; cephalothorax, 3.1 mm.; chelicerae, 2.9 mm., being proportionately shorter than in the preceding species; tibia and patella I, 10 mm.; tibia and patella IV, 5 mm.

Locality.—China: Kuliang. August 26. (N. Gist Gee). One female.

Type.—Cat. No. 866, U.S.N.M.

TETRAGNATHA PLENA, new species.

Plate 3, fig. 18.

Female.—This species is obviously smaller than any of the others here described. The coloration is of the usual pattern.

Both eye rows clearly recurved. The lateral eyes much closer together than the medians. Area of median eyes scarcely narrower in front than behind.

The species is most readily distinguished by the characters of the chelicerae. These are obviously shorter than the cephalothorax. Lower margin of furrow of chelicera armed over its whole length with a series of about twelve teeth, of which the most proximal are much reduced, and in which series there is no pronounced diastema toward distal end. Dorsal margin of furrow of chelicera with a tooth at distal end followed by a wide diastema proximad of which is a series of seven teeth. No distinct tooth at distal end either above or below.

Epigynum, Plate 3, figure 18.

Length, 6.8 mm.; tibia and patella I, 6 mm.; tibia and patella IV, 3.2 mm.

Locality.—China: Kuliang (N. Gist Gee). One female.

Type.—Cat. No. 867, U.S.N.M.

TETRAGNATHA RETINENS, new species.

Plate 3, figs. 19, 20.

Male.—The type unfortunately lacks the abdomen, but the chelicerae and palpal organ furnish means of easy distinction from *cliens*, to which it seems to be nearest. The dorsal process of the chelicera is less bent forward, more erect, than in the latter species; it is similarly bifid at the tip, but the lower tooth is proportionately smaller. Above the upper margin of the groove two large processes of distinctive form, the more mesal of these presenting a wide swelling at base. Along the upper margin of the furrow are eight smaller black teeth, one of these standing apart near the swelling of the process above mentioned, the other seven forming a series in which the teeth decrease in size caudad. At the distal end beneath a denticle, as in cliens, but mesad and proximad of this, is only one large tooth instead of two. Along the lower margin of the furrow are six small teeth, of which the most proximal stands opposite the second tooth of the dorsal series.

Palpal organ as shown in Plate 3, figure 20.

Length of cephalothorax, 2.8 mm.; tibia and patella I, 9 mm.

Locality.—China: Kuliang (N. Gist Gee). One male.

Type.—Cat. No. 868, U.S.N.M.

TETRAGNATHA CLIENS, new species.

Plate 3, figs. 21-23.

Female.—Coloration nearly as in *T. conformans* as described above. Light stripe along upper side of abdomen narrow, line-like.

Area of median eyes as wide in front as behind. Lateral eyes of each side nearer to each other than are the corresponding medians.

The chelicerae about as long as the cephalothorax. Fang of chelicera untoothed either above or below. Lower margin of furrow with a long stout tooth at distal end and directed mesad, and distad of this a denticle directed distad; proximad of the large tooth a series of eleven smaller teeth decreasing in size caudad. On dorsal side a large triangular dark tooth at distal end and beginning near middle a series of six or seven teeth decreasing in size proximad (pl. 3, fig. 21).

Epigynum with median region broadly extended caudad, the sides convex.

Male.—Dorsal apophysis of chelicera strongly curved distad, the end incised or furcate much as in *extensa* (Linnaeus) and *obtusa* C. Koch, the dorsal tooth much the smaller. Just distomesad of base of this process a nearly erect black tooth and at margin of furrow directly mesad of the process a similar tooth with axis in usual direction. Proximad of this second tooth a very stout and long tooth followed by three widely spaced and much smaller teeth, with between the proximal two of these a black denticle and proximad of the most proximal ordinary tooth two other denticles. Just mesad of edge of furrow and at distal end beneath two stout black teeth; and along edge of furrow a series of six small black teeth. See further Plate 3, figure 22.

Palpus as shown in Plate 3, figure 23.

Length of female, 8.8 mm.; tibia and patella. I, 8.4 mm.; tibia and patella. IV, 4.2 mm.

Length of male, 8.5 mm.; chelicerae, 3 mm.; tibia and patella. I, 8.8 mm.; tibia and patella. IV, 5 mm.

Locality.—China: Kuliang (N. Gist Gee). One male, one female.

Type.—Cat. No. 869, U.S.N.M.

EUCTA CHINENSIS, new species.

Plate 3, fig. 24.

Female.—In size and general appearance resembling *E. caudata.* Abdomen with the usual network of lines over a silvery ground with branched middorsal and oblique lateral lines. On the dorsum five or six pairs of black dots forming two longitudinal series, and in addition a series of somewhat larger dots along the median line. These dots, however, are absent on the younger paratypes. Hairs of anterior femora arising from minute black dots.

Pars cephalica proportionately narrower and longer than in *caudata*. Most readily distinguished by the eyes. The posterior row of eyes much more strongly recurved than in caudata. Lateral eyes on each side much more widely separated than the corresponding medians. Area of median eyes longer than wide and narrower in front than behind. Anterior row of eyes in anterior view a little procurved, the lateral eyes much smaller than the medians. Head carried forward in a rounded tubercle on which the median eyes are situated, this more marked than in *caudata*.

Abdomen of the usual general form, the cauda forming about one-fifth of the total length.

Length of not fully mature female, 9.5 mm.; tibia and patella. I, 5.8 mm.; tibia and patella, IV, 3.8 mm.

Locality.—China: Soochow (N. Gist Gee). One female.

Type.—Cat. No. 870, U.S.N.M.

LEUCAUGE RETRACTA, new species.

Plate 3, figs. 25–26.

Female.—Coloration of the usual general type. A smaller species than the following, *veterascens*, from which it differs obviously in the form of the abdomen. The abdomen projects much less forward, the caudal end also less protruding, with the caudal slope much more nearly vertical; dorsal line much more nearly horizontal.
clavately widening caudad, this feature furnishing an easy means of

Epigynum with the opening proportionately much larger than in the following species. Middle piece of dorsal wall much broader
discriminating the species (pl. 3, fig. 25).

Male.—Palpal organ as shown in Plate 3, figure 26.

Length of carapace of female, 3 mm.; width 2 mm. Length of tibia and patella I, 6.2 mm.; of tibia and patella IV, 4 mm.

Length of cephalothorax of male, 2.1 mm.; tibia and patella I, 7.8 mm.; tibia and patella IV, 4 mm.

Locality.—China: Soochow (N. Gist Gee). One male and one female.

Type.—Cat. No. 871, U.S.N.M.

LEUCAUGE VETERASCENS, new species.

Plate 3, fig. 27.

Female.—Carapace light brown, without markings. Mandibles brown of reddish cast. Sternum, labium, and endites dusky, in part black. Legs testaceous or yellow, the principal joints darkened at extreme distal end.

Chelicerae thick, very strongly bulging convexly forward at base in front.

Lateral eyes of each side connate, much farther from the medians than the latter are from each other. Area of median eyes a little longer than wide; narrower in front than behind.

Abdomen very high in front and projecting forward over cephalothorax, rounded; at caudal end projecting caudad of spinnerets in a subconical, distally rounded process. General color relieved as usual with the dull dorsal branching lines of ordinary type. A narrow stripe between epigynum and spinnerets is of brown color, bordered on each side by a bright silver-colored stripe. Sides darkened below, dull, approaching midventral stripe in color. Spinnerets dusky.

Epigynum strongly chitinized, transversely oblong. The dorsal wall of the posterior opening divided by two long furrows as usual, the median piece between exceptionally narrow, a little narrowing caudad.

Length of cephalothorax, 4 mm.; width, 3 mm. Length of abdomen, 9.5 mm.; width at middle, 4.2 mm.

Locality.—China: Soochow (N. Gist Gee). One female.

Type.—Cat. No. 872, U.S.N.M.

NESTICUS ALTERATUS, new species.

Plate 4, fig. 28.

Female.—Carapace and legs yellow. The latter without distinct markings, though the joints are vaguely darker at ends, with trace of paler subapical annulus. Abdomen above with a median longitudinal dark line sending off branches from its sides. On caudal region two transverse blackish bands continuous with vertical bands on the sides. Venter mostly black, with, toward each side, two large inclosed yellow spots which form a very conspicuous character.

Clypeus higher than the ocular area. Anterior median eyes much smaller than the others, close together, the area of median eyes being much narrower in front than behind. Posterior eyes also much nearer to each other than to the laterals. The laterals on each side contiguous. Anterior row of eyes nearly straight, the posterior recurved.

Labium as usual in the genus but a little more convex distally, the border thickened, the plate being transversely depressed proximad of this.

Differing from most other species in having the abdomen subcylindrical rather than globular.

Epigynum very large and convexly bulging, with the opening large (pl. 4, fig. 28).

Length, 4.2 mm.; tibia and patella I, 5.5 m.; tibia and patella IV, 3.8 mm.

Locality.—China: Soochow (N. Gist Gee). One female.

Type.—Cat. No. 873, U.S.N.M.

NESTICUS SUGGERENS, new species.

Plate 4, figs. 29–31.

Cephalothorax and appendages yellowish, the sternum and femora of legs in particular often a little dusky. Abdomen grey or bluish grey, with an indistinct median paler mark above.

Carapace broad and low, the pars thoracica rising above the level of the head, the form being much like that of the European *N. cellulanus* Clerck.

Anterior row of eyes straight; the medians much smaller than the laterals; eyes equidistant, separated by the radius of a median eye, or less. Posterior row of eyes straight; the eyes subequal; median eyes about their diameter apart, nearer to the laterals.

Abdomen of the male subelliptic in outline when viewed from the side, that of the female somewhat higher.

Epigynum (pl. 4, fig. 30).

Palpus of male (pl. 4, fig. 31).

Length of male (type), 2.24 mm.; cephalothorax, 1.12; tibia and patella I, 2 mm.; tibia and patella IV, 1.7 mm.

Locality.—Louisiana: Shrewsbury. February 5, 1921. One male, one female.

Type.—Cat. No. 565, M.C.Z.

NEPHILA CLAVATA L. Koch.

Nephila clavata L. Koch, Verh. zool.-bot. Ges. Wien, 1877, vol. 27, p. 741, pl. 15, fig. 4.

Locality.—China: Soochow (N. Gist Gee). Eight specimens.

ARGIOPE AMOENA L. Koch.

Argiope amoena L. Koch, Verh. zool.-bot. Ges. Wien, 1877, vol. 27, p. 735, pl. 15, fig. 1.

Locality.—China: Soochow. Several males and females, of which the latter are all immature.

Mr. Gee makes the following comments on the coloration in life: "Upper part of abdomen with three transverse lines of black and two broad ones of yellow. In the middle two large red spots back of which a black one and then yellow. The posterior region of abdomen is black with a dark red band in middle. Two rows of yellow dots, four in each. Under surface of abdomen black along middle with three pairs of yellow dots. A large yellow stripe on each side of the black. Sides brown and black. Red around spinnerets. Sternum yellow in middle, black about the edges. Male brown; tibiae of first two legs black; spots on other joints; markings of body faint."

ARGIOPE VIABILIOR, new species.

Plate 4, fig. 32.

Male.—Carapace pale testaceous, with lighter streaks radiating from the furrow, wholly without darker markings. Sternum clear yellow. Legs also light colored and wholly without annuli, with the very long spines mostly brown but in part black. Tarsus of palpus black from the dense coat of black hairs. Chelicerae small; a black line along anterior face of each continuous with one across clypeus. Dorsum of abdomen pale, more or less silvery, on proximal half with a hastate outline formed by dark hair, and on caudal half with two dark longitudinal and parallel lines. Dorsal pale area limited on each side by a wavy dark line, the side below this dark in numerous spots and streaks. Venter with two black lines converging caudad and united along ventral furrow and in front of spinnerets.

Abdomen long, pointed caudally, with sides but little curved, and subtruncate anteriorly.

Palpus as shown in Plate 4, figure 32.

Length, 8.5 mm.; cephalothorax, 3.6 mm.; width of cephalothorax, 3.2 mm.; tibia and patella I, 6.5 mm.; tibia and patella IV, 5 mm.

Locality.—China: Foochow (N. Gist Gee). One male taken September 30.

Type.—Cat. No. 874, U.S.N.M.

ARGIOPE AEQUIOR, new species.

Plate 4, fig. 33.

Male.—Integument of carapace light testaceous; sides above with a dark band formed by black hairs, a dark line similarly formed extending caudad from each median eye to caudal end of pars cephalica where it nearly meets the one on opposite side; on each side at margin a dark spot above second leg and a smaller one above the third one. Sternum yellow, with a small black spot at border opposite each endite and each leg of the first three pairs. Legs yellow excepting for a black line along ventral surface of femora of first three pairs of legs, this line typically absent, or but partially developed, on femora of fourth legs. Abdomen light dorsally, with a solid brown sagittate mark over anterior half to two-thirds of length, this mark sending out some short lines from each edge. Light dorsal area limited on each side anteriorly by a longitudinal black line, and posteriorly by a series of black lines that run from the pale area obliquely cephaloventrad on the side. Venter marked over entire length with three longitudinal black lines, the mesal edges of the outer ones of which are irregular and the median one more or less interrupted.

Abdomen nearly as in the preceding species; narrowly truncate behind, a little rounded in front.

Obviously differing from the preceding species in the form of the tibial apophyses of palpus. The principal apophysis similarly placed but longer and more slender, with the black apical part bent strongly ectocephalad, subuncate. See further Plate 4, figure 33.

Length, 7.5 mm.; cephalothorax, 3 mm.; width of cephalothorax, 2.6 mm.; tibia and patella I, 5 mm.; tibia and patella IV, 3.6 mm.

Locality.—China: Soochow (N. Gist Gee). Two males.

Type.—Cat. No. 875, U.S.N.M.

MIRANDA ZABONIKA, new species.

Plate 4, fig. 34.

Female.—Resembling *M. aurantia* in size but differing conspicuously in coloration, the proportionately longer legs, and the more slender abdomen. Carapace without markings above, a little dusky at sides, pale, clothed densely with a coat of long white hairs. Sternum black along each side, white in a broad stripe along the middle. Femora of the last three pairs of legs yellow, with a black ring at distal end; the femora of first legs black excepting for a yellow annulus a little proximad of distal end. Other joints of all legs yellow, with black annulae, the patella with one annulus about distal half, the tibia with three, the metatarsus similarly with three, of which the median is much longest, and the tarsus with one at distal end. The abdomen narrowly and smoothly subelliptic in outline, more pointed behind. The general color dorsally silvery from a dense coat of hair of that color, crossed by numerous narrow black lines which are farther apart in anterior region than in posterior. The ends of these dark lines connected on each side by a heavier wavy, or zigzag, line below which the sides are darkened by numerous finer dark lines which are mostly somewhat oblique. Venter with a black band between epigynum and spinerets enclosing a few small yellow dots and bordered on each side by a longitudinal yellow band separating it from the dark of the sides.

Epigynum having the same general structure as that of aurantia, the cavity being undivided by a septum, covered beneath by a broad and long, caudally narrowing, process from the atriolum.

Male.—The male, as usual, very much smaller than the female and differing much in coloration. Carapace pale excepting for a narrow longitudinal brownish stripe at each side of dorsum, this not extending on pars cephalica. Sternum as in the female. Legs without dark annulae excepting a very narrow one at distal end of tibia; but the femora marked with numerous very small black dots, particularly about bases of spines, these dots more pronounced on femora of the first pair. Abdomen silvery above, with a patch of white spots on each side of dorsum in front, and, over entire length, a few widely separated dark dots about bases of the long setae; sides darkened with small dots and streaks; venter with a silvery, or whitish, stripe on each side, the median region being limited on each side by a black line, the color of the intervening median portion less deep.

Length of female, 19 mm.; cephalothorax, 8 mm.; tibia and patella I, 11 mm.; tibia and patella IV, 9 mm.

Length of male, 8 mm.; cephalothorax, 3.5 mm.; tibia and patella I, 6.5 mm.; tibia and patella IV, 5 mm.

Locality.—China. Soochow (N. Gist Gee). One male and one female.

Type.—Male, Cat. No. 876, U.S.N.M.

ARANEA MULTIPLICANS, new species.

Plate 5, fig. 35.

Female.—Integument of carapace brown or chestnut; clothed with moderately abundant appressed hairs of light color. Legs with integument similarly chestnut, paler, testaceous to yellow, distally; femora with a black annulus at distal end and a more or less vague one near middle; patella ringed with dark distally; tibiae of two anterior pairs of legs with three annulae, of which the distal is broadest and deepest, the proximal one narrowest; posterior tibiae lacking the median annulus and having the distal one broader; metatarsi dark at ends. Sternum chocolate colored to black with a median longitudinal yellow line. Markings of abdomen not sharply defined. There is in all a broad black band extending from median line of anterior face across each anterolateral corner and back along the side. Over the posterior part of the side this dark band is characteristically interrupted by transverse pale lines extending across it from the dorsal light area. Dorsum at base with a short clavate black mark in the median line. When in full color there is along each side of the middorsal pale region a series of short black curved marks, there being about six of these on each side. The median pale band typically embraces a vague median longitudinal dark line which is crossed in front of the middle by a number of equally faint, transverse, chevron marks. The venter is covered between furrow and spinnerets with a black area that narrows caudad and incloses toward each lateral edge a characteristic yellow spot.

Abdomen broadly oval, dorsally planate, evenly rounded, and wholly without angular shoulders or processes.

The epigynum is large, strongly chitinized, and of dark color throughout; the scape is narrowed caudad and presents at distal end a somewhat narrower and much thinner process, which bends up dorsocaudad and is rounded at end.

Length, 12 mm.; cephalothorax, 5 mm.; abdomen, 8 mm.; greatest width of abdomen, 6.4 mm.; tibia and patella I, 7 mm.; tibia and patella IV, 4 mm.

Locality.—China: Soochow (N. Gist Gee). Two females.

Type.—Cat. No. 877, U.S.N.M.

Mr. Gee's note on this species states that it constructs a large web on low bushes. "Spider stays in web but has a nest in leaves."

ARANEA FRATRELLA, new species.

Carapace brown, clothed with gray hair. Legs a little paler, not annulate. Sternum light brown. Abdomen darkened on anterior and lateral faces; a dorsal foliate mark on caudal part.

The pars cephalica is unusually high behind, its sides very steep; dorsal surface broad and complanate, slanting forward. Area of median eyes quadrate, as wide behind as in front. Posterior median eyes obviously larger than the anterior medians.

Abdomen characterized by having an angular median hump that projects forward over carapa to caudal end of pars cephalica; anterolateral corners rounded; subtriangularly narrowed caudad, projecting far beyond spinnerets, which are near middle of ventral surface.

Length, 3.2 mm.

Locality.—China: Kuliang (N. Gist Gee). 2,500 feet. One not fully mature female.

Type.—Cat. No. 878 U.S.N.M.

ARANEA PIA, new species.

Plate 5, fig. 36.

Female.—This large and robust species is, in general, of dark and somber appearance, with markings inconspicuous. Carapace chestnut to mahogany colored, blackish along lower part of sides but with a pale marginal line. Sternum chestnut, blackish toward each side. Legs chestnut, annulate with black. Labium and endites black, pale across tips. Chelicerae black. Abdomen, in general, brown, paler beneath than above. Dorsum with a paler, triangular median mark extending forward from level of humps, and behind these with a foliate mark defined on each side by a strongly wavy black line, the foliate area a darker brown than that of the adjacent parts. Venter with a longitudinal black stripe on each side between lung-book and spinnerets, each stripe interrupted at middle or behind it by a light brown or yellowish spot.

Abdomen large, short and broad; anteriorly high, with a hump at each anterior corner above, the two humps widely separated and the surface between them complanate.

Epigynum large and strongly chitinous, black, limited on each side by a thick vertical plate. Scape arising at anterior edge and then curving ventrad and caudad far behind furrow, the curving basal part thinner and somewhat narrower than the straight distal part.

Anterior median eyes much exceeding the posterior median in size. Area of median eyes a little wider in front than long.

Length, 25 mm.; cephalothorax, 10.5 mm.; width, 8.8 mm.; tibia and patella I, 13 mm.; tibia and patella III, 11 mm.

Locality.—China: Soochow (N. Gist Gee). Two females.

Type.—Cat. No. 879, U.S.N.M.

ARANEA QUADRATA (Clerck).

Araneus quadratus CLERCK, Sv. Spindl., 1757, p. 27, pl. 1, fig. 3.

Locality.—China: Soochow (N. Gist Gee). Four specimens.

ARANEA SERICATA (Clerck).

Araneus sericatus (CLERCK), Aran. Svec., 1757, p. 40, pl. 2, fig. 1.
Araneus sclopetarius (CLERCK), Aran. Svec., 1757, p. 43, pl. 2, fig. 3.

Locality.—China: Soochow. One female.

CHINESTELA, new genus.

A genus of the group Mangoreae. Resembling the American genera *Acacesia* and *Eustala* in having the anterior coxae of the male armed at distal end with a stout, chitinous tooth. Anterior median eyes larger than the posterior medians and much farther apart, the area of median eyes a little oblique, not crinite. Lateral eyes on each side connate. The anterior median eyes much farther from the laterals than from each other. Tibia I of male strongly spined, the spines all long; tibia II, in genotype, curved, not at all swollen, with more numerous, crowded, shorter spines along anteromesal edge and some other longer and stouter spines. Patella of male palpus armed above at distal end with two long spines, the tibia with a stout, chitinous apophysis. Abdomen only moderately elongate, broader anteriorly.

Genotype.—*Chinestela gisti*, new species.

CHINESTELA GISTI, new species.

Plate 5, fig. 37.

Male.—Dorsal line of carapace straight and horizontal, or nearly so. Carapace dilute brown, with a more deeply colored band along each side. Sternum black, with a median longitudinal yellow stripe. Legs testaceous to yellow, the femora with darker areas beneath; tibiae annulate at ends on posterior pairs, those of first pair also annulate at middle but annuli weaker. Endites and labium dark, chestnut, distally paler.

Abdomen broadly rounded in front, narrowing strongly caudad, the end above spinnerets rounded. Clothed with short, pale, appressed hairs and longer, stout, brown setae arranged in transverse series, each series on a transverse ridge, the ridges giving the abdomen the appearance of being annulate. Somewhat paler along mid-dorsal region, with a narrow dark mark enclosed anteriorly, the dorsum and sides elsewhere brown. Venter black between furrow and spinnerets, a paler stripe each side.

Anterior legs much stouter and longer than the posterior. Femora of last three pairs of legs with numerous stout spines and some smaller ones arranged in a close series along ventral surface, the second femur also having a second series of finer, more widely separated spines caudad of the first ones. The principal of these series is represented on the first femur by four much smaller spines, one at proximal end and three in line at the distal, while the caudal series of femur II is represented on I by a series of similar small spines. Tibia I strongly spined, there being a principal series of six long, stout spines along the ventrocephalic surface; a series of four somewhat smaller spines along the midventral line, one of these being at the distal end and more widely separated from the others than the latter are from each other; a series of four spines on caudal surface, and a similar series on anterior face; a series of three spines dorsally, and one of four spines along dorsocaudal line. Tibia II, which is obviously shorter than I, is strongly curved and has along anteroventral edge a close-set series of numerous short but stout, moderately curved spines, there being about seventeen spines in the series with extra ones at intervals caudad of but close to the series; on anterior surface at base and just above principal series five long and much stouter spines, and on side above these but more widely separated, two other stout spines; a series of three spines along anterodorsal edge and two very small, widely separated ones on dorsal surface, one at distal end; one small spine at distal end on anterior side.

Palpus as represented in Plate 5, figure 37.

Total length, 10.5 mm.; cephalothorax, 5.25 mm.; width of cephalothorax, 4.3 mm.; length of abdomen, 6.5 mm.; width of abdomen, 3.6 mm.; tibia and patella I, 7.5 mm.; tibia and patella IV, 6.5 mm.

Locality.—China: Soochow (N. Gist Gee). One male.

Type.—Cat. No. 880, U.S.N.M.

GASTERACANTHA NABONA, new species.

Female.—Carapace black. Sternum black, excepting a small red spot at the center. Legs black, the femora at base and subapically with reddish yellow; the patella light proximally; the tibiae, metatarsi and tarsi also light over proximal part. Background of dorsum of abtarsi also light over proximal part. Background of dorsum of abdomen yellow; the spines black; a series of four black spots along anterior border between anterior spines, the median spots being the larger; two spots between posterior lateral spines, and a series of four smaller dots along caudal border; at middle a cuneiform black mark with a median longitudinal black line caudad of it. Venter of abdomen in general black, a series of light dots encircling area of spinnerets and a few light dots scattered over other parts.

Anterior margin of abdomen only moderately convex between the anterior spines. Abdomen narrowed on each side and bearing two spines very close together but not actually in contact, the anterior one a little smaller than the posterior one, and the latter a little smaller than the caudal ones.

Length, 5.6 mm.; width of abdomen between lateral spines, 7 mm.

Locality.—China: Soochow (N. Gist Gee). One female.

Type.—Cat. No. 881, U.S.N.M.

Mr. Gee's note on this form gives the general color of the abdomen as white in life. "Caught in a round web about 3 feet from ground under the limbs of a tea-oil tree."

Family THOMISIDAE.

PHILODROMUS AMITINUS, new species.

Plate 5, fig. 38.

Female.—Carapace light brown or yellow of a slightly rufous cast, paler on pars cephalica and along middorsal line caudad of it. Legs yellow, more or less weakly dusky. Abdomen above white, with dark basal mark, the latter presenting an angle on each side in front of caudal end; basal mark followed in posterior region by a series of acutely angled chevrons which tend to be broken at middle, all these dorsal marks rather faint. Sides of abdomen above dark, brownish, the lower part of sides and the venter whitish yellow. Epigynum and a spot over each lung-book deep brown or blackish.

Both rows of eyes conspicuously recurved. Eyes of anterior row with medians slightly larger than the laterals; the medians but little farther from each other than from the laterals, being twice their diameter apart and once and a half their diameter from the laterals. Posterior median eyes nearly of same size as the anterior medians, nearly twice as far from each other as from the laterals.

Femur I dorsally with three rows of spines, three spines in each row, as in *aureolus;* femur IV above with a single basal and one submedian spine and with two at distal end.

Median piece of epigynum very narrow anteriorly, but strongly clavately widening caudad, posteriorly in contact with or a little overlapped by the strongly chitinous edges of the epigynum. See further Plate 5, figure 38.

Length, 5.5 mm.; cephalothorax, 2.2 mm.; tibia and patella I, 32 mm.; tibia and patella IV, 2.8 mm.

Locality.—China: Kuliang (N. Gist Gee). One female taken in grass.

Type.—Cat. No. 882, U.S.N.M.

PHILODROMUS LOUISIANUS, new species.

Plate 5, fig. 39.

Female.—Carapace dusky brown to nearly black on the sides, leaving a broad median light band which is anteriorly wider than the eye-area. The median light band embraces a dark spot on caudal end of pars cephalica, this spot geminate by a median longitudinal light line. Eyes ringed with pale. Clypeus dark, as also the chelicerae. Sternum yellowish. Legs dusky brown excepting the proximal end of femur, which is paler, yellowish, the light color sometimes extending along the ventral surface. Abdomen dark above, with a median pale area on anterior portion, the pale area embracing a dark lanceolate mark; venter greyish, without definite markings.

Posterior row of eyes recurved; median eyes three times as far from each other as from the laterals. Anterior median eyes farther from each other than from the corresponding laterals in ratio 7:5. Area of median eyes much wider behind than in front (5:3), and about of same length as width in front. Anterior row of eyes very nearly straight. Anterior lateral eyes a little larger than the medians, from which they are separated by a distance less than that separating them from the posterior medians (4:5), a little nearer to the posterior medians than to the posterior laterals.

Legs strongly scopulate, the scopulae on the anterior ones extending over tarsus and metatarsus nearly equal to the basal spines of the latter. Three pairs of spines above on femur I.

Cephalothorax a little wider than long (7:6.5).

Epigynum (pl. 5, fig. 39).

Length, 6 mm.; cephalothorax, 3 mm.; tibia and patella I, 4 mm.; tibia and patella IV, 3.5 mm.

Locality.—Louisiana: Mandeville. Three females taken in May, 1921.

Type.—Cat. No. 561, M. C. Z.

Family AGELENIDAE.

AGELENA LABYRINTHICA (Linnaeus).

Aranea labyrinthica LINNAEUS, Syst. Nat., ed. 10, 1758, vol. 1, p. 620.

Locality.—China: Soochow (N. Gist Gee). One male and one female taken October 5.

TEGENARIA, species.

Locality.—China: Kuliang. One immature specimen taken August 26.

COELOTES KULIANGANUS, new species.

Plate 5, fig. 40.

Female.—In alcohol, the carapace, sternum, mouth parts, and legs are dark yellow, the carapace dusky about the eyes, but neither carapace nor legs with any definite markings. Carapace glabrous. Sternum with numerous long, erect dark hairs. Mouth parts and legs clothed with similar long bristles, with intervening shorter ones. Ground color of abdomen dusky grey; dorsally a series of black chevron marks which in the anterior half united along middorsal line; the ectal ends of the posterior chevrons bent forwards on the upper part of the sides and then ventrad. Abdomen clothed with numerous long oblique bristles, with shorter, nonappressed ones intervening.

Anterior row of eyes shorter than the posterior by the radius of an eye at each end. Anterior row straight, with the medians obviously smaller than the laterals. Anterior median eyes a little less than their radius apart, closer to the laterals. Anterior laterals nearly their diameter from edge of clypeus. Posterior row of eyes straight; eyes equal in size and equidistant, not fully their diameter apart. Lateral eyes on each side not more than their radius apart.

Labium longer than wide; distal margin mesally concave.

Lower margin of furrow of chelicera armed with two, moderately small, teeth.

Tibia I and metatarsus I each armed beneath with three pairs of spines of which the basal and submedian ones are long and slender, the distal ones short. Femur I with two long slender spines on anterior surface toward distal end, and tibia I with one at distal end. Tibia II with two spines on anterior surface.

Epigynum without trace of lateral marginal teeth. Anterior area depressed, the edges posteriorly more strongly chitinous and bent mesad on each side to edge of middle piece, which is wide.

Length, 7.8 mm.; cephalothorax, 3.9 mm.; tibia and patella I, 4 mm.; tibia and patella IV, 4.5 mm.

Locality.—China: Kuliang (N. Gist Gee). One female. 2,500 feet. August 17.

Type.—Cat. No. 883, U.S.N.M.

Family PISAURIDAE.

DOLOMEDES INSURGENS, new species.

Plate 6, fig. 41.

Male.—The body is marked with the usual broad dorsal dark band over carapace and abdomen, this band limited on each side by a pale stripe clothed mostly with white hairs. The lateral edges of the dorsal band more deeply colored, blackish, while each lateral pale stripe is limited above by a denser, wavy, silvery line. Sternum yellow, with a darker stripe on each side, and several, more or less obscure, dark and radiating lines, or with a continuous black midventral stripe and one toward each lateral border. Legs yellow, not banded. Dark dorsal area of abdomen clothed with chiefly black hairs, but embracing anteriorly a paler sagittate mark and five or six pairs of spots formed by white hair. Sides of abdomen also black just below pale stripe, the color becoming less dense ventrad. Venter darkened in spots and streaks, but with a clear longitudinal line on each side from epigastric furrow to spinnerets.

First row of eyes longer than the second. Anterior median eyes obviously larger than the laterals, their diameter being between one-fourth and one-fifth greater; less than their radius apart, nearer to the laterals. Eyes of second row large; much less than their diameter apart. Area formed by first and second eyes broader than height of clypeus.

This species in general much resembling the European *D. fimbriatus*, but readily distinguishable from that species and the Japanese *fimbriatoides* in the differing structure of the male palpus. The dorsal tibial apophysis presents a tooth, or spine, on the ectal side of its base as in fimbriatus; but this is much larger, and the principal branch differs in being distally acute instead of truncate or somewhat expanded. The inferior tibial apophysis is short and stout, bent forward distally. A dense patch of spiniform setae at distal end of tibia on ectal side, a corresponding, though less pronounced, patch of similar but smaller setae at distal end of patella. See further, Plate 6, figure 41.

Total length, 12 mm.; cephalothorax, 5.8 mm.; width of cephalothorax, 4.9 mm.; tibia and patella I, 8.5 mm.; tibia and patella IV, 8.2 mm.

Locality.—China: Soochow. Two males and one immature female.

Type.—Cat. No. 884 (N. Gist Gee), U.S.N.M.

DOLOMEDES CHINESUS, new species.

Plate 6, fig. 42.

Female.—The integument of carapace black excepting a bright yellow stripe on each side at middle height, a fine light median longitudinal line along middle and down posterior declivity, and a narrow yellow median mark on clypeus. Chelicerae reddish, with a black line down the anterior face of each. Endites yellow ventrally, blackish ectally. Palpi with black markings on femora and a blackish annulus on patella and on tibia. Labium blackish. Sternum yellow, clothed with short whitish hairs and much longer, stiff, dark bristles. Legs with coxae black mottled with yellow; femora with integument solid black beneath and laterally, paler along dorsal surface but there with numerous black dots, clothed densely with brown hair which in the dry specimen cloaks the black of the integument; patellae colored like the femora but other joints light brown of a somewhat reddish cast; spines all black. Abdomen with a broad dorsal band of black, this enclosing a short pale stripe anteriorly; the black dorsal area limited on each side by a yellow stripe corresponding with that on carapace, the side below this stripe dark, but gradually passing below into the yellow or pale brown of the venter; venter with a black median quadrate area caudad of epigynum.

First row of eyes much longer than the second; median eyes with diameter a third longer than that of the laterals, about their radius apart. Eyes of second row large, less than their diameter apart. Area formed by first and second eye-rows much narrower than the clypeus.

All tarsi and metatarsi scopulate; the metatarsi of posterior legs with scopulae less developed proximally.

The epigynum seems most like that of *D. hercules* Bösenberg and Strand, but differs obviously in the form of the median piece, which is relatively larger, completely filling the space between the lateral ridges, with lateral angles projecting into an excavation in latter on each side. See Plate 6, figure 42.

Length, 21 mm.; cephalothorax, 9 mm.; tibia and patella I, 11.5 mm.; tibia and patella IV, 12 mm.

Locality.—China: Soochow (N. Gist Gee). One female.

Type.—Cat. No. 885, U.S.N.M.

Family LYCOSIDAE.

SOSIPPUS MIMUS, new species.

Plate 6, fig. 43.

Female.—Integument of carapace black, in life largely concealed on sides of thoracic division with grey hair; head with a fine light colored median longitudinal line with a similar line on each side diverging caudad from between the eyes, these lines clothed with somewhat orange-colored hair, hair of similar color being also present on sides of head. Sternum brown. Integument of legs brown, not annulate, clothed with finer grey hair and coarser black hair, the grey hair disappearing distally and appearing along dorsal surface of metatarsi in a series of spots, the scopular black as usual. Abdomen clothed above with grey and black hair, the dorsum showing a basal spear-mark furcate behind, each point of the furcation being followed by a series of confluent black spots, those of each side connected by fine chevron lines; lower part of sides showing some brown; venter caudad of epigastric furrow with two black lines that converge caudad and almost meet, thereafter running parallel to each other.

Anterior row of eyes decidedly longer than the second row, procurved, nearly equidistant, the laterals distinctly more than their diameter from the lower margin of the clypeus.

Lower margin of furrow of chelicera with three stout teeth.

Tibia III and IV with a setiform spine in median dorsal line at base, this distally fine, but none at middle or distal end.

Epigynum somewhat resembling that of *Sosippus floridanus* Simon (pl. 6, fig. 43).

Length, 18 mm.; cephalothorax, 9.2 mm.; tibia and patella I, 7.5 mm.; tibia and patella IV, 9 mm.

Locality.—Louisiana: Mandeville. H. E. Hubert. May 1, 1921. Two females.

Type.—Cat. No. 1012, M. C. Z.

This species might seem to be atypical in possessing only three teeth on the lower margin of the furrow of the chelicera. However, it shares this character with the Costa Rican *S. agalenoides;* and as the number of teeth varies on the two sides in some individuals of *S. floridanus*, it is not thought that this character by itself is a reliable generic index.

The field note states that the two specimens of the present species were taken in a funnel web, indicating that the species conforms in habits to the others previously observed.

TEIPPUS, new genus.

Both anterior and posterior spinnerets two-jointed, the second joint of the posterior distinct though relatively rather smaller than in *Sosippus*. Suggesting typical *Sosippus* also in having four teeth on the lower margin of the furrow of chelicera. Readily distinguishable from other genera in having the anterior row of eyes distinctly recurved.

Genotype.—*Teippus lamprus*, new species.

TEIPPUS LAMPRUS, new species.

Female (immature).—Carapace broad, yellowish brown, clearer yellow in a band on each side above the black marginal line and on each side of head, a darker mark at caudal end of head, the labrum black. Chelicera with a black stripe down the front. Sternum, labium, and endites yellow. Legs yellow, annulate with black. Dorsum of abdomen yellow or orange with a black median basal mark followed by a series of black chevrons. A black band over each anterolateral corner and extending a short distance back on the side. Venter somewhat greyish yellow, clearer yellow at the sides.

Anterior row of eyes a little recurved, the medians farther from each other than from the laterals. Posterior eyes on tubercles protruding laterad. First and second rows in equal length.

Tibiae I and II armed beneath with three pairs of spines, a pair at base and a pair each side of the middle, but none at distal end; a spine on each lateral surface toward distal end. Metatarsi I and II ventrally with a pair of spines at base, a pair at middle, and a single median one at distal end, with a spine ventrolateral in position each side of and a little proximad of the latter. Tibiae III and IV with two median dorsal spines.

Abdomen a little constricted behind middle, shape much as in Oxyopes.

Length, 4.2 mm.; cephalothorax, 1.83 mm.; tibia and patella I, 2.4 mm.; tibia and patella. IV, 2.29 mm.

Locality.—Louisiana: Fallon. One not fully mature specimen taken February 16, 1921, by H. E. Hubert.

Type.—Cat. No. 1013, M. C. Z.

LYCOSA HUBERTI, new species.

Plate 6, fig. 44.

Female.—Integument of carapace on sides dusky or chocolate-brown, a broad light stripe along middle and constricted at posterior eyes, and a light band on each side above the black margin. Sternum brown, or rather chestnut. Legs lighter brown, without annuli or other markings. Chelicerae and anterior face of head black. Abdomen dark grey or blackish over the sides, the intervening dorsal region with a background of reddish brown and showing a spear-mark outlined in black at base and followed by chevron lines extending on each side into the black of the sides; venter brown to brownish yellow, sometimes dusky but without definite markings.

Anterior row of eyes obviously shorter than the second, plainly procurved, eyes equidistant, the medians much the larger.

Lower margin of furrow of chelicera with three stout teeth.

Tibiae III and IV with two median dorsal spines.

Epigynum with median piece inversely T-shaped, with the cross piece depressed so as to be much dorsad of the level of the portions of the epigynal plate bordering it laterally and anteriorly. See Plate 6, figure 44.

Length, 12 mm.; cephalothorax, 6.2 mm.; tibia and patella I, 5.4 mm.; tibia and patella IV, 6 mm.

Locality.—Louisiana: Talisheek. Six females taken March 4, 1920, by H. E. Hubert.

Type.—Cat. No. 1014, M. C. Z.

Paratypes.—Cat. No. 1015, M. C. Z., and in the collection of H. E. Hubert.

LYCOSA ACOMPA, new species.

Plate 6, fig. 45.

Female.—Carapace chocolate-colored on the sides, with a wide median dorsal stripe of lighter color, the integument showing no distinct lateral light bands. Sternum chocolate-colored. Legs brown, the tibiae and metatarsi, particularly of the posterior pairs, rather vaguely annulate with dark. Abdomen with dorsum grey, showing a dark spear-shaped outline at base with indistinct dark lines and dots behind; sides and venter darker.

Anterior row of eyes slightly procurved, shorter than the second, the median eyes only a little exceeding the laterals in size.

Lower margin of furrow of chelicera with three stout teeth.

Tibiae III and IV with the usual two median dorsal spines, and the spining of anterior tibiae normal.

Septal piece of epigynum inverted T-shaped with the median part strongly widened cephalad (pl. 6, fig. 45).

Length, 8.2 mm.; cephalothorax, 4 mm.; tibia and patella I, 3.33 mm.; tibia and patella IV, 3.58 mm.

Locality.—Louisiana: New Orleans. One female taken in March. H. E. Hubert.

Type.—Cat. No. 1016, M. C. Z.

LYCOSA EPISIMA, new species.

Plate 6, fig. 46.

Female.—Carapace, in alcoholic specimen, dark chocolate-colored or blackish on the sides with a median longitudinal band of reddish yellow nearly as wide as eye area. Sternum yellow at middle, dusky along each side. Legs dusky brown. Abdomen characteristically marked with a median yellow band over its entire length, this band enclosing a faint spear-mark at base. Sides of dorsum and upper parts of sides of abdomen dark, blackish, the dark breaking up into spots on lower part of sides. Venter pale, with dark spots forming a longitudinal line on each side.

Anterior row of eyes shorter than the second, decidedly procurved; median eyes larger than the laterals, the latter once and a half or twice their diameter from the lower margin of clypeus; median eyes nearer to each other than to the laterals.

Lower margin of furrow of chelicera with three teeth, of which the proximal one is smallest.

First two pairs of ventral spines of tibiae I and II long and overlapping. Tibiae III and IV with the usual median dorsal spines.

Epigynum as shown in Plate 6, figure 46.

Length, 8.2 mm.; cephalothorax, 3.4 mm.; tibia and patella I, 3.25 mm.; tibia and patella IV, 3.75 mm.

Locality.—Louisiana: Mandeville. One female taken by H. E. Hubert May 1, 1920.

Type.—Cat. No. 1017, M. C. Z.

LYCOSA SUPRENANS, new species.

Plate 7, fig. 47.

Female.—Carapace with a median longitudinal light stripe that extends forward between the eyes of the third row, but does not quite reach those of the second row, which are upon a black ground; this stripe bisected anteriorly by a median longitudinal black line. A narrow light stripe on each side twice or more its width above the margin. Chelicerae dark, almost mahogany. Sternum dusky, with a median longitudinal pale, and also paler on each side. Legs brown or dusky brown, with some lighter hairs but no distinct annuli. Abdomen dark above, with a median longitudinal light stripe over the entire length, this stripe crossed in its caudal portion with several dark chevron lines and embracing in its anterior portion a hastate outline. Sides of abdomen and lateral portion of venter also dark; venter with a narrow median longitudinal dark band, bordered on each side with a light stripe.

Upper and lower margins of chelicerae each armed with three teeth.

Anterior row of eyes much shorter than the second, distinctly procurved; median eyes less than their radius apart, about an equal distance from the much smaller lateral eyes. Anterior lateral eyes nearly their diameter from lower margin of clypeus, farther from eyes of second row. Eyes of second row less than their diameter apart. Dorsal line of carapace nearly horizontal from eyes to posterior declivity, which is short and very steep.

First two pairs of spines of anterior tibiae long and slenderly tipped, the posterior one of basal pair overlapping the base of the corresponding spine of the median pair.

Epigynum as shown in Plate 7, figure 47.

Length, 15.5 mm.; cephalothorax, 7 mm.; tibia and patella I, 7.8 mm.; tibia and patella IV, 8 mm.

Locality.—Louisiana: Shrewsbury. Several females.

Type.—Cat. No. 558, M. C. Z.

LYCOSA PSEUDOANNULATA (Bösenberg and Strand).

Tarentula pseudoannulata BÖSENBERG and STRAND, Abh. Senckenb. Naturf. Ges., 1909, vol. 30, p. 319, pl. 8, fig. 106; pl. 13, figs. 323, 326, 334, 338.

Locality.—China: Soochow, Waung Tien, Daung Lake. Ten specimens, males and females.

ORINOCOSA ORIENS, new species.

Plate 7, figs. 48, 49.

Female.—The carapace is dark on the upper part of the sides, but with the dark area crossed by paler lines. A broad middorsal stripe on carapace as wide as the eye area anteriorly, narrowing down the posterior declivity. Area between eyes black. Lower part of sides yellow, the light area broader than the dark one above it, some dark lines from the latter partially crossing it. A deep black marginal line on each side, with a small dark spot above it opposite the interval between each two legs. A median spot between first and second eye rows is clothed with white hair. Legs yellow, the femora with mostly four dark annuli, which are interrupted above and below; tibiae with two longer annuli and the metatarsi with three. Sternum and the venter of abdomen clear yellow. Abdomen yellowish above, with a dusky spear mark at base and several indistinct chevrons behind; some dark partially fusing lines down each side.

Anterior row of eyes only slightly procurved, the clypeus beneath it not receding as it does in the genotype. Anterior median eyes larger than the laterals, almost contiguous with the latter, separated from each other by more than their radius; twice their diameter from lower margin of clypeus. Eyes of second row large, about their diameter apart, farther from eyes of third row. Ocular area much wider behind than in front (about as 5:4), and much wider than long (5:4), the width in front nearly equaling the length. The cephalothorax 3.12 times as long as the ocular area.

Lower margin of furrow of chelicera armed with three teeth, of which the two proximal ones are closer together; a minute fourth tooth present on one side in the type at the distal end of the series.

Labium rather wide, distally incurved, darker than the endites.

First legs missing. Tibia of second legs armed beneath with three pairs of spines, of which the basal and median are very long, the distal short; with 1–1 spines on anterior face. Patella of legs II to IV, inclusive, with two median spines above, one basal and one distal; the tibiae also with two very long median dorsal spines, one at base and one between middle and distal end.

Epigynum (pl. 7, fig. 48).

Male.—In color, differing from female in having annuli of legs obscure or in part obliterated; also in having the middorsal stripe of carapace densely clothed throughout with fine white hair, the sides clothed with numerous dark hairs, which in dry specimen renders the lower light stripes indistinct. The abdomen above lacks the dark markings, the entire dorsum being clothed densely with white hair and thus contrasting strongly with the darker sides.

Palpal organ as shown in Plate 7, figure 49.

Length of female, 4.2 mm.; tibia and patella IV, 2.8 mm. Male a little smaller, with legs proportionately somewhat longer.

Locality.—China: Kuliang (N. Gist Gee). A male and female taken in low grass among stones.

Type.—Cat. No. 886, U.S.N.M.

The egg sac is subspherical, in present condition light brown, with paler equatorial zone.

PARDOSA LAURA (Karsch).

Lycosa laura KARSCH, Verh. Ver. Rheinl., 1879, vol. 36, p. 102, pl. 1, fig. 21.

Locality.—China: Soochow. Twelve specimens, all immature excepting one male.

The annulations of the legs are narrow and numerous in the young specimens, but are obsolete in the adult, as usual.

PARDOSA ASTRIGERA L. Koch.

Pardosa astrigera L. KOCH, Jap. Arachn., Verh. zool.-bot. Ges. Wien, 1877, vol. 27, p. 42, pl. 16, figs. 37, 38.

Locality.—China: Soochow (N. Gist Gee). Many specimens.

Simon records this species as very common in the environs of Pekin. It is also a common form in Japan.

Family OXYOPIDAE.

OXYOPES SERTATUS L. Koch.

Oxyopes sertatus L. KOCH, Verh. zool.-bot. Ges. Wien, 1877, vol. 27, p. 779.

Locality.—China: Soochow (N. Gist Gee). One female.

Family ATTIDAE.

HYLLUS MIMUS, new species.

Plate 7, fig. 50.

Male.—A median light stripe extending over entire length of cephalothorax and abdomen; this stripe is generally clothed with white hair, but with some dark yellow intermixed on posterior part of abdomen, this in form of indistinct chevrons; of bluish cast between eyes; stripe on abdomen widening caudad of middle, midway between which and the caudal end it is produced into a small point or process on each side. Carapace each side of median stripe and over upper part of sides and in a narrow marginal stripe black or nearly so, the lower part of sides covered by a broad light stripe clothed with white hair. Dorsum of abdomen each side of median band and the upper part of sides deep chocolate brown or blackish. Sides of abdomen and lateral and anterior region of venter clothed with white and dark yellow hair intermixed, the median part of venter caudad of furrow black, as in *giganteus* and various other species, but the sternum pale brown or testaceous. Legs with integument light brown, the anterior ones darker; femur and patella with some longitudinal stripes and marks formed by black hair between white areas, Chelicerae, endites, and labium chestnut colored, the chelicerae in front bearing numerous long white hairs of bluish cast. Numerous long dark bristles from dark area each side in eye region and from dark lateral bands of abdomen as well as from posterior region of median light stripe of the latter.

Eyes of usual general arrangement. The posterior eyes much farther apart than from edge of carapace on each side.

Chelicerae of only moderate size, not divergent as in the male of *giganteus*, and the fang much smaller, not toothed.

Femur I with dorsal spines 1, 2, 5, the end ones sublateral in position; femur II with dorsal spines 1, 2, 5; femur III with spines 1, 3, 5, one of the 3 being sublateral; femur IV with spines 1, 2, 5. Patella I armed in front with one spine; patellae II, III, and IV armed both in front and behind one spine. Ventral spines of tibia I, 2–2–2, with one on anterior surface; ventral spines of tibia II, 2–2–2, with one on anterior surface and 1–1 on the caudal.

Tibia of palpus with a stout, curved, acute, black-tipped apophysis on ectal side of distal end.

Female.—In what is regarded as the female of this species the median dorsal light stripe extends forward only to the eye area on carapace, and likewise does not reach anterior end of abdomen, being in general less conspicuous; in addition to the process extending from median stripe on each side of posterior part of dorsal band on abdomen, a pair of diverging light lines from anterior end extend out across dark band on each side. Abdomen above more brownish and venter without any dark area.

Length of male, 9 mm.; cephalothorax, 4.5 mm.; tibia and patella I, 5.2 mm.; tibia and patella IV, 4 mm.

Locality.—China: Soochow (N. Gist Gee). Two males and one female.

Type.—Cat. No. 887, U.S.N.M.

DENDRYPHANTES LOUISIANUS, new species.

Plate 7, fig. 51.

Female.—Integument of carapace chestnut, black about the eyes, with that of chelicerae, endites, labium, sternum, and the coxae, trochanters, and femora of anterior legs similarly dark. Carapace in general clothed with more or less iridescent brown scales; between the eyes of the second row a transverse band of white scales, and beginning behind the posterior eyes a median longitudinal band of similar white scales, this band showing a tendency to extend transversely at its anterior end. Clypeus crossed by a band of white scales which extends back on the sides below the eyes. Chelicerae with white scales. Palpi clothed with white hair and white scales. The legs in general have the integument black at the ends of the joints; clothed with mostly whitish scales which do not completely cover the dark integument. Abdomen above in general covered with brown scales; a band of white scales extending around the anterior end and back on each side; anteriorly the dorsum shows two pairs of white spots and behind these on each side three oblique white lines joining the white of the side. Venter white on each side, with a dark median longitudinal stripe which is nearly goblet-shaped with base at spinnerets.

Tibia I with 3–3 ventral spines, of which those under the anterior border occupy but little more than half the length of the joint, while those under the posterior border are more widely separated. Tibia II ventrally with two spines at distal end and two spines in series proximad of the caudal one of these. Metatarsus I and II with 2–2 spines beneath. Leg I much thickened, particularly the femur.

Epigynum as shown in Plate 7, figure 51.

Locality.—Louisiana: Kenner.

Type.—Cat. No. 558, M. C. Z.

PELLENES TEXANUS, new species.

Plate 7, fig. 52.

Male.—Integument of carapace blackish; pars cephalica clothed between eyes with grayish brown, a band of the same continuing over pars cephalica and down the posterior declivity; also a narrow longitudinal band of this same color below eyes on each side and extending caudad, the carapace elsewhere clothed with white and light gray hair. Legs also clothed nearly uniformly with whitish hair, with no distinct banding, but dorsal surface of patella and tibia of first legs clothed with brown. Tarsus of palpus also clothed with brown hair. Venter, sides, and most of abdomen clothed with white appressed hairs; a brown longitudinal stripe along each side of dorsum, the intervening region in type badly rubbed but apparently clothed in life chiefly with white.

Palpal organ as shown in Plate 7, figure 52.

Length, 4 mm.; cephalothorax, 2.28 mm.; tibia and patella I, 1.25 mm.; tibia and patella IV also 1.25 mm.

Locality.—Texas: Austin. One male. R. V. Chamberlin, Aug., 1909.

Type.—Cat. No. 571, M. C. Z.

EXPLANATION OF PLATES.

All drawings made by the author.

Plate 1.

Gnaphosa suchuana.

Fig. 1. Epigynum.

Argyrodes biclavis.

2. Anterior end of cephalothorax, dorsal view.
3. The same, lateral view.
4. Abdomen in outline, lateral view.
5. Right palpus of male, ectal view.

Anibontes mimus.

6. Right chelicera, anterior view, of male.
7. Right palpus of male, ectal view.

Plate 2.

Anibontes mimus.

8. Dorsal view, appendages omitted.

Bathyphantes erythroides.

9. Epigynum.

Graphomoa theridioides.

10. First leg, in outline.
11. Abdomen in outline, lateral view.
12. Epigynum.

Tetragnatha conformans.

13. Chelicera of female, upper view.
14. Chelicera of male, upper view.
15. Right palpus of male, ectal view.

Ceraticelus nubiliceps.

16. Palpus of male, mesoventral view.

Plate 3.

Tetragnatha sociella

17. Right chelicera of female, upper view.

Tetragnatha plena.

18. Chelicera of female, mesodorsal view.

Tetragnatha retinens.

19. Right chelicera of male, upper view.
20. Right palpus of male, ectal view.

Tetragnatha oliens.

FIG. 21. Right chelicera of female, upper view.
22. Left chelicera of male, upper view.
23. Right palpus of male, ectal view.

Eucta chinensis.

24. Anterior end of cephalothorax, dorsal view.

Leucauge retracta.

25. Epigynum.
26. Right palpus of male, subectal view.

Leucauge veterascens.

27. Epigynum.

PLATE 4.

Nesticus alteratus.

28. Epigynum.

Nesticus suggerens.

29. Abdomen of male, lateral view.
30. Epigynum.
31. Right palpus of male, ectal view.

Argiope viabilior.

32. Right palpus of male, ectal view.

Argiope aequior.

33. Right palpus of male, ectal view.

Miranda zabonika.

34. Right palpus, ectal view.

PLATE 5.

Aranea multiplicans.

35. Epigynum, ventral view.

Aranea pia.

36. Epigynum, lateral view.

Chinestela gisti.

37. Left palpus of male, ectal view.

Philodromus amitinus.

38. Epigynum.

Philodromus louisianus.

39. Epigynum.

Coelotes kulianganus,

40. Epigynum.

PLATE 6.

Dolomedes insurgens.

41. Right palpus of male, ectal view, with all ordinary setae omitted as usual.

Dolomedes ohinesus.

FIG. 42. Epigynum.

Sosippus mimus.

43. Epigynum.

Lycosa huberti.

44. Epigynum.

Lycosa acompa.

45. Epigynum.

Lycosa episima.

46. Epigynum.

PLATE 7.

Lycosa suprenans.

47. Epigynum.

Orinocosa oriens.

48. Epigynum.
49. Right palpus of male, ventral view.

Hyllus mimus.

50. Right palpus of male, ectal view.

Dendryphantes louisianus.

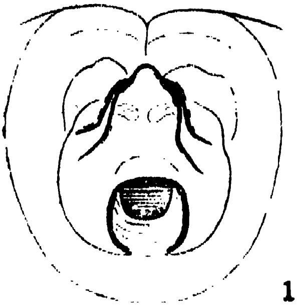
51. Epigynum.

Pellenes texanus.

52. Palpus of male, ventral view.

Theridion, species.

53. Epigynum, lateral view.



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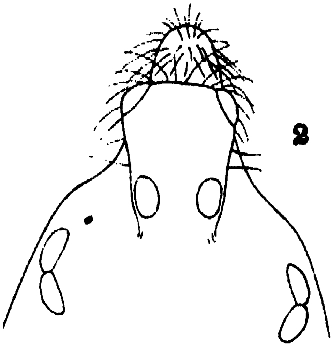

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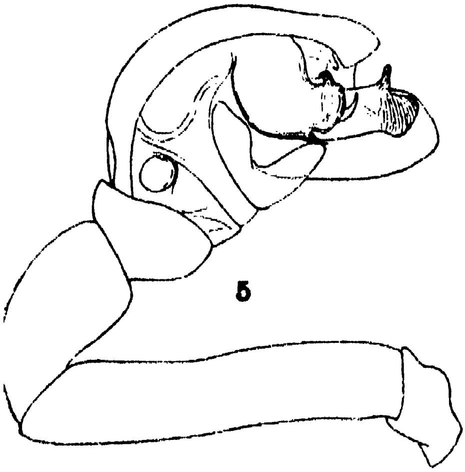

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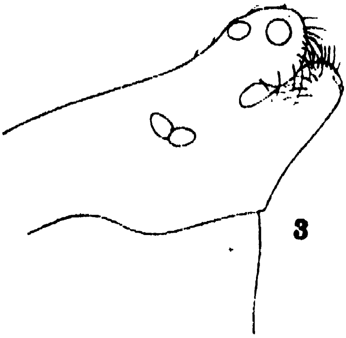

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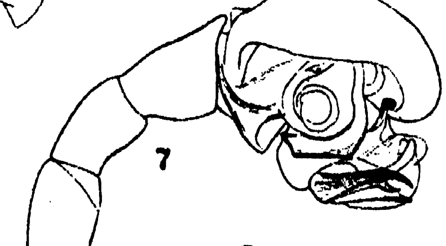

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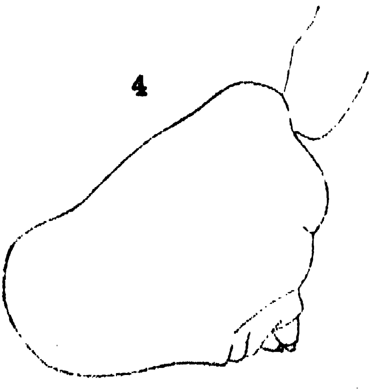

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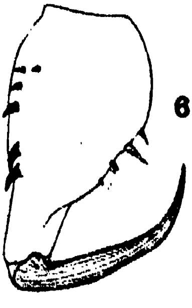

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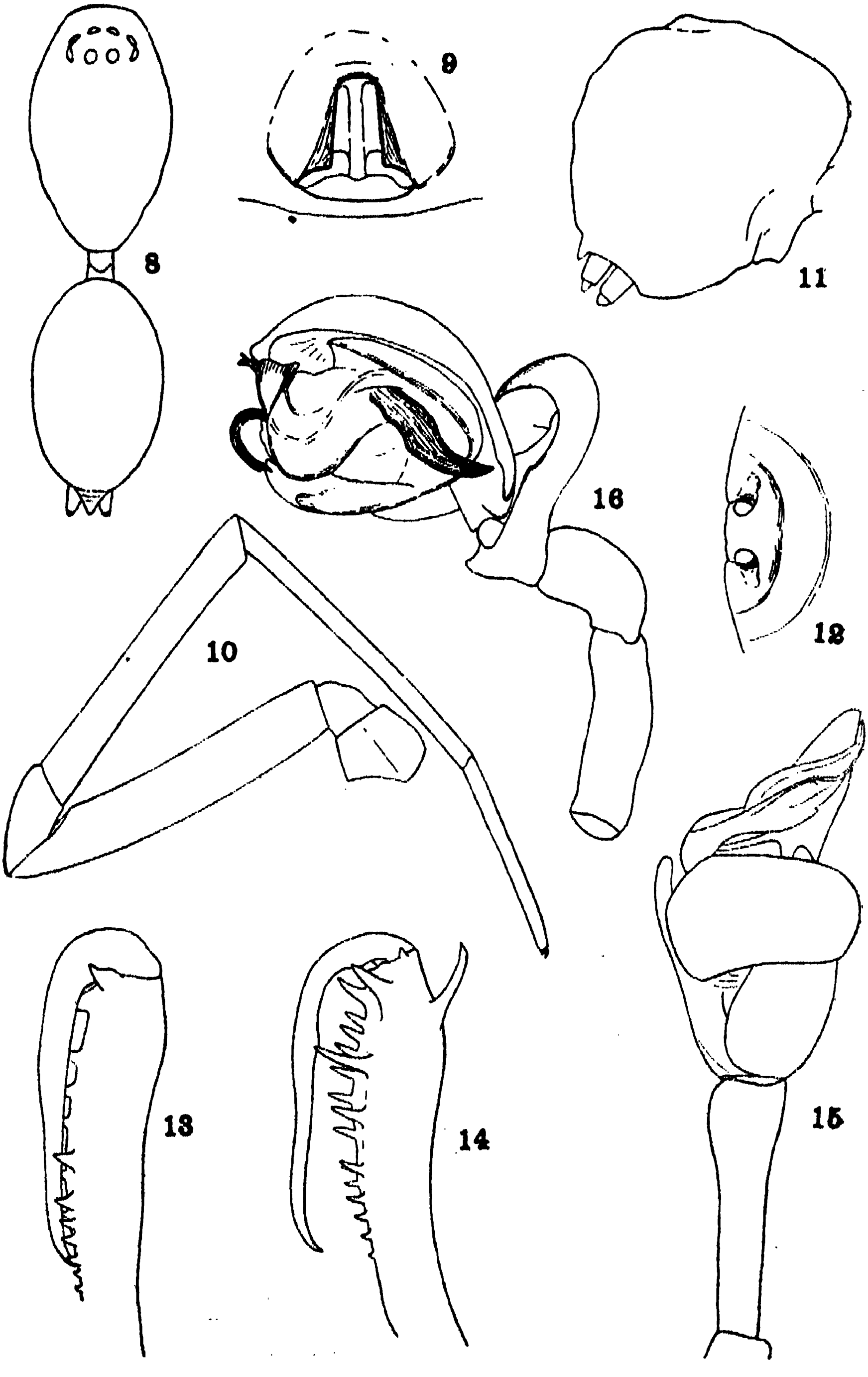

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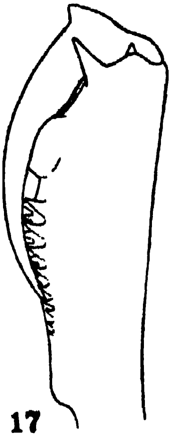

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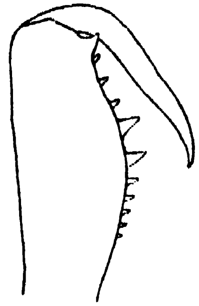

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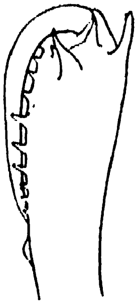

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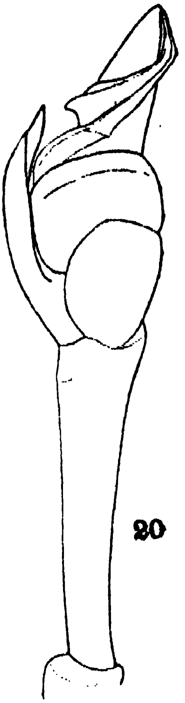

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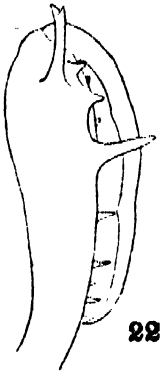

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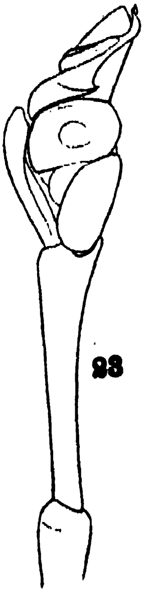

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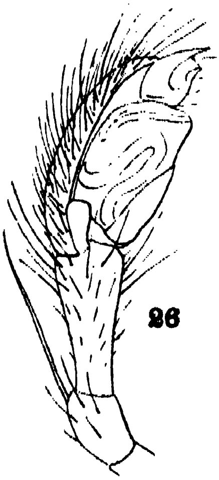

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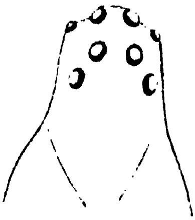

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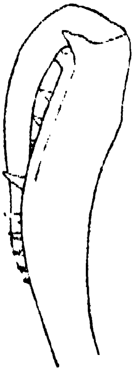

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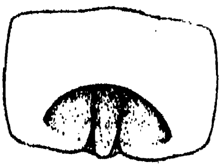

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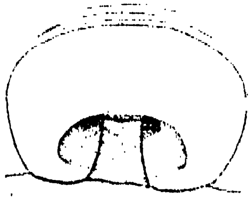

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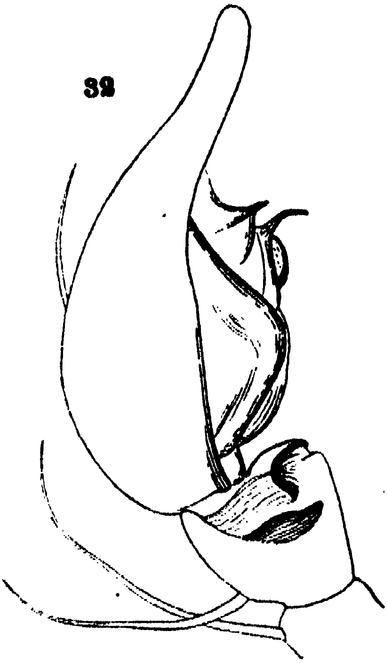
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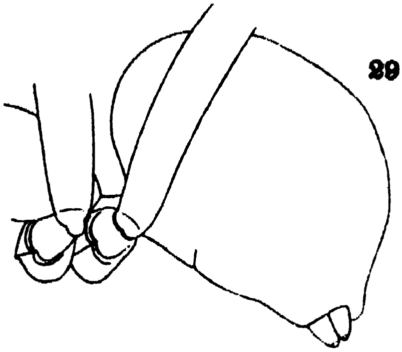
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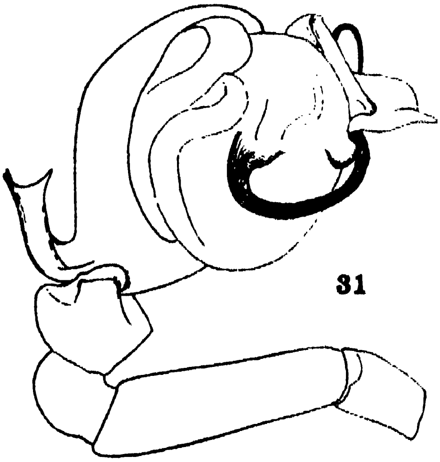
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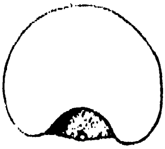
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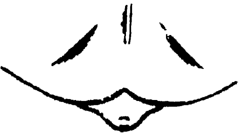
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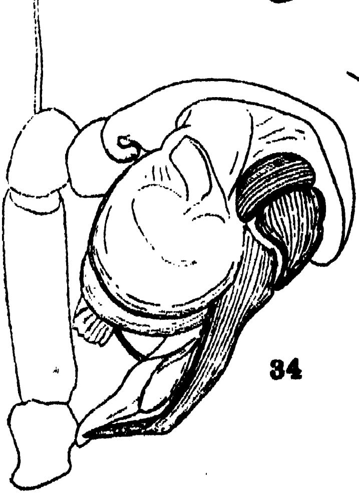
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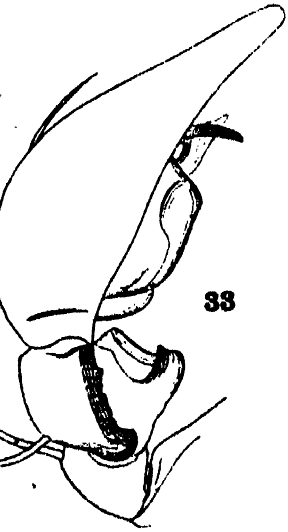
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NEW AMERICAN AND CHINESE SPIDERS

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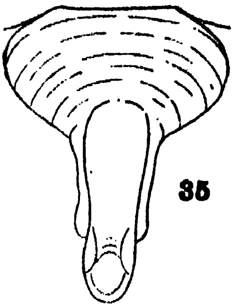

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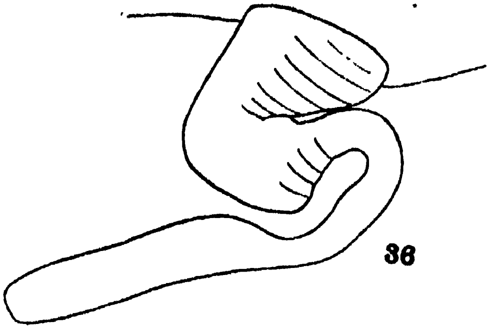

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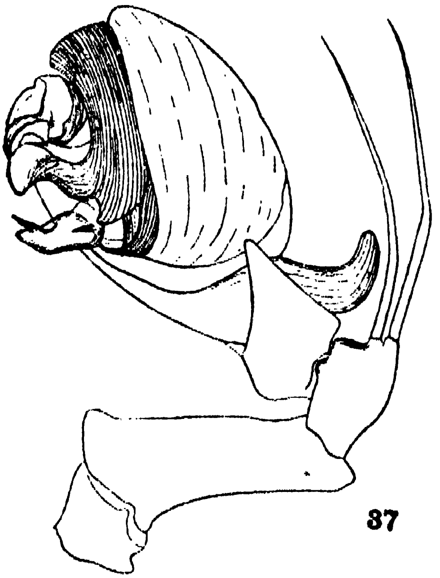

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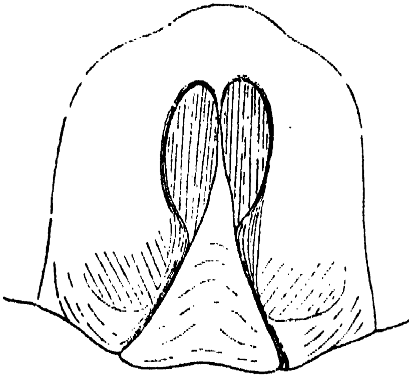

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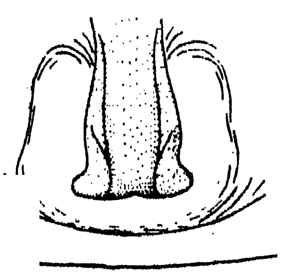

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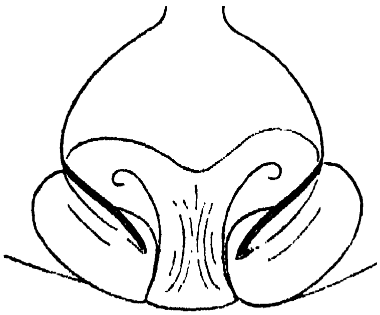

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New American and Chinese Spiders

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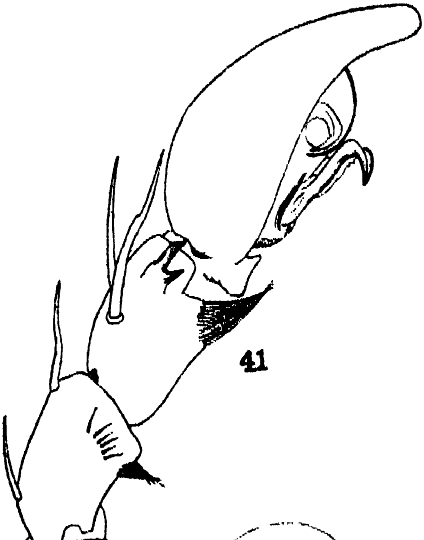

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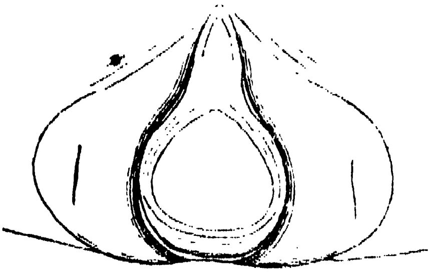

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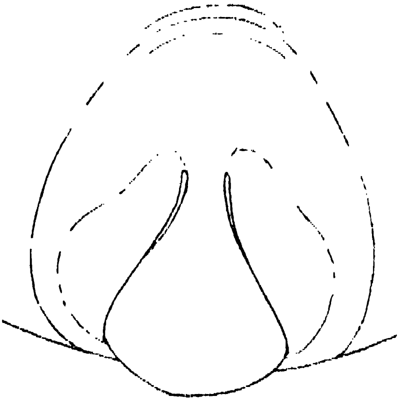

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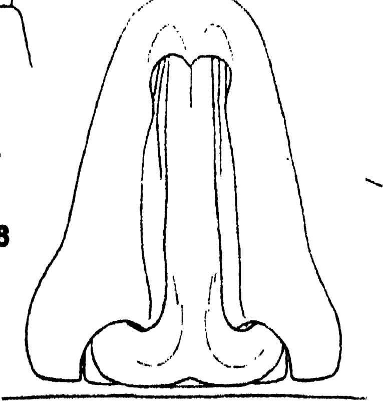

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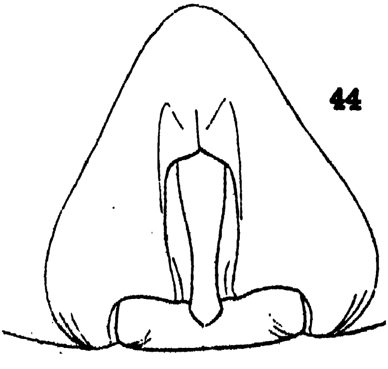

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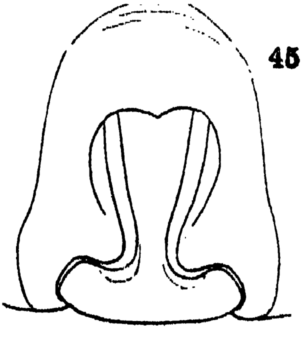

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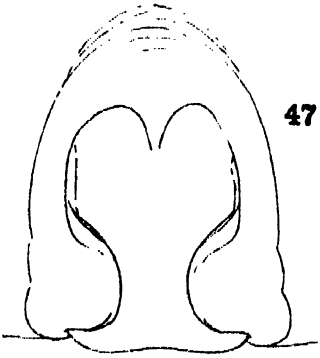
New American and Chinese Spiders

For explanation of plate see pages 37 and 38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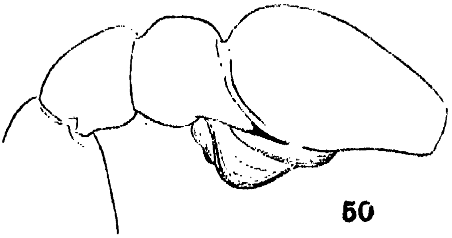
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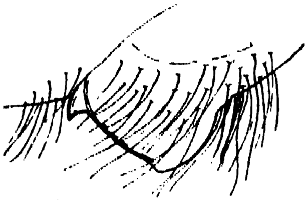
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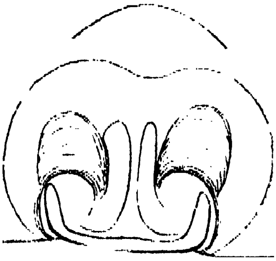
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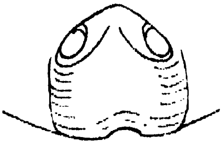
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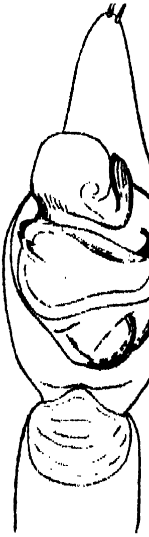
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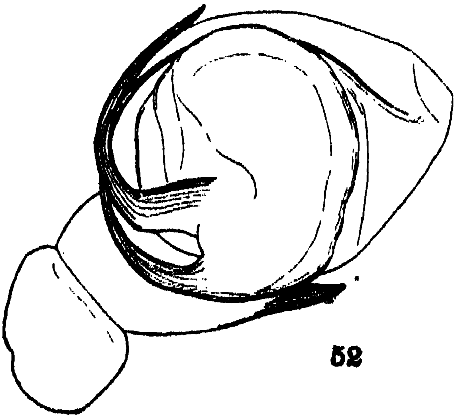
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NEW AMERICAN AND CHINESE SPIDERS

FOR EXPLANATION OF PLATE SEE PAGE 38

A FOSSIL PORPOISE FROM THE CALVERT FORMATION OF MARYLAND.

By Remington Kellogg,

Of the Bureau of Biological Survey, United States Department of Agriculture.

INTRODUCTION.

Our knowledge of the fossil cetacean fauna of the Calvert formation has hitherto been and still is very imperfect, notwithstanding the description of a number of forms by E. D. Cope. Until lately imperfect vertebrae represented our entire knowledge of most of the cetaceans described from this formation. Notwithstanding the recent explorations of the Calvert Cliffs and the acquisition of a number of skulls, detailed information as to the zonal range of the cetacean fauna is still wanting. The exact localities for the fossil cetaceans described by Cope and collected by James T. Thomas in Charles County, Maryland, have never been published. In consequence the zonal position of most of these specimens will probably remain unknown, unless subsequent discoveries show that some of the fossil cetaceans are limited in their geologic range to one zone. It is very unlikely that any cetacean had such a short geologic range.

The collection of fossil cetaceans in the United States National Museum includes a fairly representative assemblage of the cetaceans known to have frequented the Chesapeake embayment during the interval in which the Calvert formation was deposited. Most of the types of fossil cetaceans necessary to a complete understanding of this material as well as additional specimens from Tertiary marine deposits of North America have been studied. The object of the present paper is to describe a fossil porpoise collected by Norman H. Boss on one of his trips to the Calvert Cliffs on the western shore of Chesapeake Bay, Maryland.

For the privilege of describing this fossil cetacean I am indebted to C. W. Gilmore and J. W. Gidley, of the Division of Vertebrate Palaeontology, United States National Museum. For permission to examine types of fossil and living cetaceans I desire to extend my thanks to Dr. Witmer Stone and James A. G. Rehn, of the Academy of Natural Sciences, Philadelphia; to Dr. W. D. Matthew, of the American Museum of Natural History, New York; and to Gerrit S. Miller, jr., of the Division of Mammals, United States National Museum. Dr. John C. Merriam, president of the Carnegie Institution of Washington, has kept in touch with this work as it progressed and I am indebted to him for assistance.

THE GENUS ZARHACHIS COPE.

Type.—*Zarhachis flagellator* Cope, E. D., Proc. Acad. Nat. Sci., Philadelphia, vol. 20, pp. 186, 189, 1868; vol. 21, pp. 9–10, 1869.

Type locality.—Miocene marl of Charles County, Maryland. Calvert formation. Upper Miocene.

Type specimen.—An anterior caudal vertebra. Cat. No. 11231, Academy of Natural Sciences of Philadelphia.

Cope proposed *Zarhachis flagellator* for two lumbar and two caudal vertebrae which were assumed to represent three different individuals. Three of the vertebrae mentioned in 1868 were subsequently withdrawn by Cope and referred to other species. In 1868, Cope referred the genus *Zarhachis* to the family Delphinidae, but in a later article[1] he allocated the genus with the Platanistidae. The original description consists of the following:

> ### ZARHACHIS Cope.
>
> This genus is established on vertebrae which bear a general resemblance to those of *Priscodelphinus*, but differ in the essential point of having flat and broad diapophyses of the caudals. It is therefore intermediate between that genus and *Delphinapterus*. The posterior of the caudals in our museum exhibits a narrowing of the diapophyses, as certain of the lumbars do in *Priscodelphinus*.
>
> ### ZARHACHIS FLAGELLATOR Cope.
>
> This species is represented by only two lumbar and two caudal vertebrae, which belonged to at least three different individuals, none of them adult. Neither is any one entirely perfect, but they indicate a very distinct species, by clear characteristics. All of these vertebrae are of greater length as compared to the diameter than in any other cetacean known by me except the great *Basilosaurus*. The lumbars, when compared with those of *T. lacertosus*, differ in their broadly obtuse median line, which offers distinct trace of the two keels. An anterior caudal either exhibits unusually broad diapophyses, which are directed downwards, or else is a lumbar with two keels, and a median groove below, which is not seen in any other species. The caudals exceed in length those of any other species. One of these, from a large individual, resembles that of *P. atropius* in the narrow basis of the diapophysis which is probably narrow, and not perforate. The length of the vertebrae is nearly double the vertical depth of the articular faces. The diapophysis is nearly median; the basis of each neurapophysis is one-half the length of the centrum, and median.

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[1] Cope, E. D., The Cetacea. American Naturalist, vol. 24, p. 615. July 31, 1890.

	In.	Lin.
Length lumbar (epiphyses hypothetical)	3	6.5
Depth	2	2.0
Width	2	3.0
Width neural canal	2	8.0
Length caudal (one epiphysis supplied)	3	10.5
Depth caudal	2	4.0
Distance between inferior keels		10.5
Width basis diapophysis		10.5

A year later, Cope[3] corrected his original description and gave a synopsis of the characters of the species of this genus. It is evident from the following quotation that the genus *Zarhachis* as amended by Cope is not a natural assemblage.

> It was stated to differ from *Priscodelphinus* in that, while some caudals had spinous diapophyses, others possessed them flat, but imperforate. A vertebra supposed to indicate the latter characters I am now compelled to refer to another species and probably genus. Other vertebra assigned to *C. flagellator* must be referred elsewhere. A lumbar vertebra represents another species of probably the same genus, while a third has evidently pertained to still a third species. The genus will be characterized by the extraordinary length and slenderness of the lumbar vertebrae, and similar, though slightly abbreviated form of the caudals. The latter have spinous diapophyses, and in one species the former also. While the width of the articular faces of the centra of these vertebrae in the typical *Priscodelphinus* is but a few lines less the length, in the species of this genus the diameter of the same is only from four-sevenths to one-half of the length. The nearest approach is made by *Priscodelphinus stenus*, where this diameter is six-sevenths of the length.
>
> I. Median or anterior caudal with strong longitudinal keel above the diapophysis—which is therefore probably present on the distal lumbars.
> Epiphysis thicker, larger ---------------------------------- *Z. flagellator*
> II. No longitudinal keel on lumbars, Diapophyses broad, flat; epiphyses thin, large ---------------------------------- *Z. tysonii.*
> III. Diapophyses narrow, subspinous; epiphyses thin, small.
> ---------------------------------- *Z. velox.*

At this time the writer proposes to restrict the application of the generic name *Zarhachis* to *flagellator;* the allocation of *tysonii* and *velox* will be discussed in connection with other material which is now being studied. So far as the present evidence goes, there are some grounds for believing that caudal vertebrae like those of *Zarhachis flagellator* can properly be associated with the present specimen.

The caudal vertebra in the Academy of Natural Sciences of Philadelphia which appears to be the type, and is so labeled, is much worn at both ends, and the anterior epiphysis is missing. The lateral processes and the neural spine are broken off; the neural arch is complete, the canal narrow and slitlike posteriorly and broadly oval anteriorly. This vertebra is peculiar in having the transverse processes set in elliptical depressions, divided posteriorly by a thin ridge extending back from the base of the process. This depression is bounded superiorly by a longitudinal ridge, above which is another depression at the base of the neural arch. The posterior epiphysis is thick and flat. The articular surface has about 12 or 14 radiating lines. The double keels[3] are emarginate at the middle, and the surface of the centrum between them concave. This caudal belonged to a large porpoise as is shown by the following measurements.

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[3] Cope, E. D., Proc. Acad. Nat. Sci., Philadelphia, vol. 21, p. 9. 1869.

	mm.
Length of vertebra (one epiphysis lacking)	101
Greatest depth of centrum	59
Breadth of centrum anteriorly (worn)	55
Depth of centrum anteriorly (worn)	53
Height neural canal anteriorly	12
Height neural canal posteriorly	27
Length of base of neural arch (where margins are vertical)	41
Length of base of transverse process (about)	25
Height of depression surrounding transverse process (measured to emargination of keel below)	42

A satisfactory comparison of the present specimen and the vertebra upon which Cope based *Zarhachis flagellator*, however, is not possible as the corresponding vertebra was not found. The measurements for the lumbar vertebrae of the specimen from the Calvert Cliffs and for the caudal of *Zarhachis flagellator* bear out the assumption that they belong to the same type of cetacean. In addition to a correspondence in size of the vertebrae, there are certain structural peculiarities which favor such an association. The posterior lumbars of the fossil porpoise from the Calvert Cliffs have an elongate centrum as well as a relative narrow and deep neural canal. The neural arch does not occupy the full length of the centrum and on the largest caudal there are double ventral keels and corresponding development of the depressions on either side. There is no trace, however, of a longitudinal keel above the transverse process. The type caudal of *Zarhachis flagellator*, as remarked above, is peculiar in having the transverse processes set in elliptical depressions, but on the whole the structural features of this caudal vertebra and those of the lumbars described in the following text are of the same general type, when one takes into consideration the corresponding differences between the lumbar and caudal vertebrae of the living porpoises, *Platanista gangetica* and *Inia geoffrensis*. In addition both of these specimens were obtained from deposits belonging to the Calvert formation.

---

[3] Case, E. C., Miocene Atlas, Maryland Geol. Surv., Baltimore, pl. 14, fig. 3, 1904.

From the type caudal of *Zarhachis flagellator* and the specimen described in the following pages, the following characters have been derived which are considered diagnostic of the genus.

Diagnosis.—General architecture of top of skull as in *Lipotes* and resembling *Platanista* in certain details, but with a long attenuate rostrum comprising more than five-sixths of the total length of the skull. The beak is neither bowed upward, nor bent downward, but is approximately straight; the basicranial axis presumably is not strongly bent downward from the axis of beak. The internal portion of the proximal extremity of the premaxilla is thin and platelike as in *Lipotes* and *Platanista*, and does not form a convex raised anterior border to the nasal apertures as in *Inia*. For more than four-fifths of the total length of the rostrum the raised convex portions of the premaxillae are closely appressed and parallel each other to the tip of the rostrum, thus forming the roof for the mesorostral gutter. The presphenoid rises to the level of the premaxilla as in *Lipotes*. The maxillae posterior to the maxillary notches expand laterally, sheath the internal faces of the thick up-built supraorbital processes of the frontals, and partially roof over the temporal fossae. The zygomatic process of the squamosal is in contact with the postorbitial projection of the supraorbital process of the frontal. The external pterygoids extend forward beyond the level of the maxillary notches and conceal the palatines. The nasal passages are situated anterior to the level of the anterior margins of the squamosals. There is a deep groove between the squamosal and frontal bones into which the foramen ovale opens. The total number of teeth exceeds three hundred. The first tooth on either side of the rostrum is considerably larger than any of the following teeth. The enamel crowns of the teeth are ornamented with fine longitudinal striae. The roots are slightly thickened. The ankylosed symphysial portion of the mandibular ramus equals eight-elevenths of the total length of either mandible.

The periotic bone bears a close resemblance to that of *Platanista*. The most important differences consist of a more elongated internal acoustic meatus, and a wider interval between the foramen singulare and the cerebral aperture of the facial canal. The tympanic bone also is very similar in general features to that of *Platanista*.

The hyoid bones differ from those of *Platanista* and agree in some respects with those of *Inia*. They consist of a central portion (basihyal) with large, expanded, subcrescentic wings (thyrohyals) and a pair of short, anterior, conical projections (ceratohyals). The stylohyals are free, elongate, and slightly curved.

The atlas is free and possesses both upper and lower transverse processes. The greatest length of the atlas is about one-half of the greatest width across the anterior articular facets. A pair of large vertebrarterial canals pierce the neurapophyses and in addition there are foramina for the spinal nerves. Ten dorsal and at least four lumbar vertebrae are present. As a whole the vertebral column bears a closer resemblance to *Platanista* than to any other living porpoise. The neural spines are deep, flattened, and rather squarely truncated on their upper extremities. The transverse processes of anterior caudals are set in elliptical depressions. The posterior caudals are perforated dorso-ventrally by paired arterial canals. The first seven pairs of ribs have capitula articulating with the centra as well as tubercula articulating with the transverse processes. The three posterior ribs articulate with the transverse process. The first three pairs of ribs are compressed and their necks are bent at right angles to the shafts. The eighth, ninth, and tenth ribs lack necks. The sternum resembles that of *Platanista* and differs from that of *Inia* in the absence of vertical conical processes behind the articular facets for the first ribs.

Remains of river porpoises are relatively rare in the Calvert Cliffs, and only one skull and associated skeleton have been obtained. A few imperfect vertebrae which apparently belong to the same type of cetacean have been examined by the writer, but these specimens do not warrant description. Judging by the relative quantity of remains of fossil cetaceans which have been assembled in institutions to which acknowledgments have been given, the family Platanistidae seems to have been outnumbered by long and short beaked dolphins as well as by whalebone whales during the deposition of the Calvert formation in the Chesapeake embayment.

Specimen.—Cat. No. 10485, Division of Vertebrate Palaeontology, United States National Museum. The skeleton of this fossil porpoise is incomplete. It includes a nearly complete skull. The rostrum is entire and the preservation is excellent, but most of the posterior end of the cranium, with the exception of the bones which form the vertex, was missing when the skull was collected. The lachrymals and jugals are missing and the right pterygoids are imperfectly preserved. The periotic and the two tympanic bones found with the skull are all imperfect or broken. Both lower jaws are preserved, though they are badly crushed in the region of the coronoid. The sternum is incomplete. The hyoid bones are perfect and entire. One cervical, ten dorsal, four lumbar and three posterior caudal vertebrae, as well as four chevron bones, were found associated with the skull. Sixteen ribs and eighteen bones of the paddle also belong to this specimen.

Locality.—The occurrence of the specimen is as follows: Near latitude 38° 40′ 30″ North and longitude 76° 32′ West, on the western shore of Chesapeake Bay, approximately one mile south (1,610 meters) of

Chesapeake Beach, Calvert County, Maryland. Shown on Patuxent quadrangle or Patuxent folio, No. 152, United States Geological Survey.

Horizon.—The specimen was discovered and excavated by Norman H. Boss on August 8, 1921. It was dug from the cliffs three feet (0.92 meter) above the water level. The oyster shell zone is not visible at this point, and lies below the beach level. The specimen was dug from Shattuck's zone 5 of the Calvert Miocene formation of Maryland.

It may seem surprising that the skull of this fossil porpoise manifests many of the peculiar features of *Platanista*, *Lipotes*, and *Inia*. The combination of characters is of much interest, though this form can not be considered an ancestor of any of these living genera. Although the skull of this fossil porpoise possesses more features in common with *Lipotes* than with *Inia*, there are obvious differences in the details of structural modification which are present throughout those parts of the skeleton which are available for comparison.

The resemblance of certain portions of the skulls of *Lipotes* and *Platanista* to this fossil is undoubtedly a common inheritance from more primitive ancestors. The modifications of the bones which take part in the formation of the nasal passages and the structural peculiarities of the premaxillae are essentially the same in all three skulls. This fossil skull in common with *Platanista* possesses a large expanded external pterygoid, a deep groove between the squamosal and frontal bones, a zygoma with broad glenoid surface, a supraorbital process in contact with the zygoma, maxillary teeth with narrow recurved crowns, and a peculiar type of tympanic and periotic bones.

Skulls of *Lipotes* and *Inia* may appear more specialized than that of *Zarhachis* because of the elevation of the vertex and the shifting of the nasals to a vertical position. On the other hand, the skull of *Zarhachis* is characterized by an unusually long attenuated rostrum, by the great vertical depth of the extremity of the supraorbital process, and by a zygomatic process which extends forward beyond the level of the anterior wall of the brain case and underlies the postorbital projection of the frontal. *Lipotes* possesses a rather high maxillary crest, but the extremity of the supraorbital process is relatively shallow and the rostrum is proportionately shorter than in *Zarhachis;* the frontal plate of the maxilla is nearly horizontal above the temporal fossa and the rostrum is constricted behind the tooth rows. In *Inia*, however, the outer edge of the frontal plate of the maxilla is bent upward and forms a vertical crest above the temporal fossa, the extremity of the supraorbital process is less strongly curved upward, the premaxilla in front of the nasal aperture is swollen or conspicuously convex internally, and the rostrum is not constricted behind the tooth rows.

As seen from ventral view, the nasal passages of the *Platanista* skull are far posterior to that which is normal for practically all living porpoises, for their posterior margins lie in the same level as the anterior margins of the squamosals. In skulls of *Lipotes* and *Inia*, and in practically all of the Delphinidae, the nasal passages are situated considerably in advance of the anterior ends of the squamosals. The ventral opening for the infraorbital canal in the skull of *Platanista* is considerably behind the supraorbital process and entirely within the temporal fossa. In most dolphins, including *Lipotes* and *Inia*, the opening for this canal is situated in advance of or but slightly posterior to the anterior margin of the supraorbital process of the frontal and never within the temporal fossa. The optic canal is floored by the frontal bone in *Platanista* while in *Lipotes* the ventral wall of the canal is missing.

The external and internal pterygoids project forward in front of the nasal passages in the *Platanista* skull. In skulls of *Lipotes* and *Inia*, the forward projecting external pterygoid is absent and a large expanded alisphenoid fills the space between the squamosal, parietal, frontal, and internal pterygoid. Skulls of *Lipotes* and *Inia* thus lack one of the characteristic bones of the *Platanista* skull. It is not surprising that the external pterygoid should disappear, for it arises from the *processus alaris* of the basisphenoid and in some cetaceans, including *Platanista*, prevents the ascending process (alisphenoid) of that bone from appearing in the temporal fossa. The development and pressure of air sacs in this region according to Winge may account for the final disappearance of the external pterygoid. The relations of the internal pterygoid, vomer, and maxilla to one another are described in another part of this paper (pp. 15–16).

The cavity for the brain in the skull of *Platanista* is relatively smaller than that of *Lipotes*. It does not necessarily follow that the brain of *Platanista* is either a primitive or a secondarily degenerated type. Although more than 40 years have elapsed since the publication of Anderson's notable memoir on *Platanista*, no additional information regarding the brain of this porpoise has been published. The following quotations[4] summarize the conclusions reached by Anderson.

> I may sum up this much of the cerebral anatomy by stating that, so far as the convolutions and sulci are concerned, this species of dolphin has a brain of a considerably simpler type than in the porpoise or common dolphin, tending perhaps to some of the Carnivora, though in such a slight degree as still to impress it with all the attributes of the complex convoluted cerebrum of the

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[4] Anderson, J., Anatomical and Zoological Researches: Comprising an account of the Zoological Results of the Two Expeditions to Western Yunnan in 1868 and 1875. London (1878), pp. 465, 466–467, 1879.

Cetacea. * * * All things considered, the brain of *Platanista* is wanting in the broad rotundity of the whale group generally and so marked in *Orcella*. To a very limited degree it has Elephantine characters, viz, height and moderate breath, though one can not regard it in any other light than that of a modified Cetacean form.

The eyes of the Ganges River dolphin are of small size and probably do not function beyond conveying sensory impressions of varying degrees of light and darkness. Functional eyes would be of relatively little use in the muddy waters of the Ganges River.

The relations of the basicranial bones suggest that the rostrum and brain case have been telescoped together to a greater extent than in other river porpoises. To recapitulate the evidence in favor of this observation it might be pointed out that in correlation with the rostrum being depressed below the brain case, the nasal passages have moved backward and are situated on a level with the enterior margins of the squamosals, the internal and external pterygoids extend forward to the level of the maxillary notches and thus entirely conceal the palatines, the opening for the infraorbital canal is within the temporal fossa, the zygoma is in contact with the supraorbital process of the frontal, the antero-posterior diameter of the supraorbital process of the frontal has been shortened and the process as a whole deflected obliquely forward as would be expected to result from a lowering of the rostrum, and the lachrymal has been pushed inward and its posterior projection has been wedged into the maxilla instead of being inserted between the maxilla and the supraorbital process of the frontal as in *Lipotes*. In skulls of *Lipotes* and *Inia*, the postpalatal axis bends downward from the axis of the rostrum while both axes of the *Platanista* skull lie in approximately the same plane.

Although there seems to be great diversity of opinion as expressed in the published writings of many investigators regarding the allocation of the genus *Platanista*, the majority agree that this genus bears some relationship to *Inia* and *Lipotes*. Of course, one can only surmise the incipient modifications which marked the development of those types of porpoise skulls we now know either fossil or living. In cases of the river porpoises, practically nothing is known about their past geological history. Among the living forms, *Platanista* may represent the most highly specialized type. The architecture of the *Platanista* skull in the region around the palatines, as shown above, is singularly modified in comparison with the conditions found in *Phocaena*. Skulls of *Lipotes* and *Inia* represent advanced stages of another type of cranial architecture. The basicranium of the *Zarhachis* skull closely conforms with that of *Platanista*, but the general architecture of the dorsal face of the skull and rostrum agrees with that of *Lipotes*. No comparisons can be made with *Eoplatanista* Dal

Piaz because the extremities of the supraorbital processes are missing and the cranium is very imperfectly preserved.

Whenever forms which are manifestly different from each other as regards certain structures are associated together within limited groups, it follows that such forms should possess some fundamental structures in common. Here again difficulties are obvious for each investigator naturally holds that the structures with which he is most familiar are fundamental. Usually, it is merely a question of the relative importance to be attributed to each set of structural peculiarities and what group or groups of forms will best elucidate the particular features which each investigator considers most important. In the opinion of the writer, fundamental structures are to be found in the periotic and tympanic bones of the Cetacea. In view of the peculiar combinations of characters which are found in the abovementioned genera and the general similarity of the earbones, it appears that *Zarhachis* represents one line, *Platanista* a second line, and *Inia* or *Lipotes* a third line of a common ancestral stock.

SKULL.

Dorsal view.—The general arrangement of the elements comprising the dorsal portion of this fossil skull (pl. 1) is similar to that of *Lipotes vexillifer.*[5] The differential characters of the present species are shown by the extremely long attenuate rostrum and the accompanying elongation of the ankylosed symphysis of the mandibles, the prolongation of the zygomatic process of the squamosal and of the postorbital portion of the supraorbital process of the frontal so that there is actual contact between them, and the absence of an elevated vertex.

The long, flattened, and attenuated rostrum comprises more than five-sixths of the total length of the skull and is neither bowed upward nor bent downward. Anterior to the premaxillary foramina, the premaxillæ are thick and convex; they decrease in width and in height toward the tip of the rostrum. If the homologies of the bones forming the tip of the rostrum are correctly understood, then the premaxilla extends forward beyond the maxilla as a wedge-shaped splint which is closely appressed to the large recurved front tooth. A small V-shaped indentation (15 mm. long and 6.5 mm. broad anteriorly) separates the two premaxillae at the tip of the rostrum; this indentation leads to a small canal which presumably represents the roofed over mesorostral gutter.

The inner margins of the premaxillae become closely appressed to one another at a point 165 mm. in front of the maxillary notches and continue in contact to the apex of the above-mentioned indentation at the tip of the rostrum. The premaxillae thus completely roof over the mesorostral gutter throughout most of its length. They diverge posteriorly and commence to spread apart, as remarked above, at a point 165 mm. anterior to the maxillary notches. The mesorostral channel is thus exposed for a distance of 160 mm. in front of the anterior end of the presphenoid. The raised convex portions of the premaxillae are widest just anterior to the premaxillary foramina and taper rapidly as they approach the level of the nasal passages, and disappear slightly posterior to the supraorbital processes of the frontals.

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[5] Miller, G. S., jr., A new river dolphin from China. Smiths. Misc. Coll., vol. 68, No. 9, Publ. 2486, pp. 1–11, pls. 2, 4, 6, Washington, 1918.

There are three pair of foramina on the distal one-third of the rostrum. No trace of similar foramina can be found in the skull of *Lipotes*, though they are present in *Inia*, but are irregularly placed and are found as far back as the maxillary notches. Since these foramina are present in pairs, measurements were taken and their relative positions are shown in the following table:

Position of the Paired Foramina near tip of Rostrum.

	First pair.	Second pair.	Third pair.
	mm.	*mm.*	*mm.*
Distance from tip of rostrum to foramen on right side.	78.0	109.5	243
Distance from tip of rostrum to foramen on left side.	92.5	115.0	258

The suture between the maxilla and premaxilla becomes obliterated in front of the third pair of foramina. A shallow groove extending forward leads from either of these foramina and follows the assumed line of fusion of maxilla and premaxilla; these grooves terminate behind the second pair of foramina. The grooves for the second pair of foramina are very short, but those for the first pair are well defined and rather deep. The latter terminate on either side anterior to the third tooth. The left premaxillary foramen is large (greatest diameter 7 mm.) and is situated approximately 48 mm. in advance of the nearest maxillary foramen. A broad and deep groove extends backward from each premaxillary foramen and crosses the premaxilla in an oblique course from internal to external margins, terminating at or near the level of the posterior face of the supraorbital process of the frontal. There are several small maxillary foramina on the left side of the skull, but only one can be found on the right side.

The vomer apparently increases in width posteriorly, but, as the rostral extension of this bone is concealed for the most part by the overhanging premaxillae, this interpretation is based solely on the short interval of mesorostral gutter exposed in front of the presphenoid. In this region the vomer forms the floor of the gutter and takes part in the formation of the lateral walls. If any reliance can be placed upon the anterior limit of the exposed vomer as seen from the ventral view of the rostrum and upon analogous relations of the same element in the skull of *Lipotes*, then the vomer disappears in the floor of the mesorostral gutter about 240 mm. in front of the maxillary notches. It appears that the vomer contributes the greater part of either wall of the mesorostral gutter in front of the presphenoid, but the corresponding surfaces of vomer and premaxillae are so smoothly mortised into one another that the actual line of contact can not be determined with any degree of accuracy. It is evident, however, that the contact between the vomer and either premaxilla has its posterior limit near the anterior end of the presphenoid. The dorsal margins of the mesorostral gutter are formed by thin plates of the premaxillae which project inward from the raised convex outer portions and whose edges are deflected obliquely upward.

The premaxillae do not closely approximate each other above the presphenoid to form a slit-like anterior border for the nasal apertures as in *Lipotes*. In consequence most of the anterior end of the presphenoid is visible. This porous bone forms a plug across the proximal end of the mesorostral gutter and rises to the level of the premaxillae above. In this last-mentioned feature, however, the skull of this fossil porpoise agrees more closely with *Lipotes* than with *Inia*.

All of the brain case posterior to the nasal passages, with the exception of a small portion which comprises the vertex, was missing when the skull was excavated. Unfortunately the ascending portion of the mesethmoid also has been largely destroyed. The small fragments of this bone which still adhere to the dorsal surface of the presphenoid show that the mesethmoid forms the partition separating the nasal passages superiorly. Both nasal passages of this fossil skull are well preserved and one is thus permitted to describe these structures in considerable detail. After a most thorough comparison with *Platanista*, *Lipotes*, and *Inia*, it was found that the relations of the various elements which enter into the formation of these passages are essentially the same in all. The mesethmoid sheathes or forms a thin veneer of bone around the dorsal face and the upper halves of the lateral faces of the presphenoid, conceals the frontal fontanelle, and extends downward in either nasal passage to meet the ascending process of the vomer. On the base of the skull the vomer extends backward across the basisphenoid.

Hence the vomer sheathes the ventral face of the presphenoid and extends upward on either lateral face to meet the descending processes of the mesethmoid. Thus the mesethmoid and the vomer line the internal walls of the nasal passages. Ventrally, the posterior, the external, and the lower portion of the anterior wall of either nasal passage are formed by the internal pterygoids. Each internal pterygoid is in contact posteriorly with the vomer and anteriorly with the ascending process of the palatine. The anterior wall of either nasal passage superiorly is thus formed by the ascending process of the palatine externally and by the posterior margin of the maxilla internally. The premaxilla contributes the uppermost portion of the anterior wall and limits the dorsal extension of the ascending process of the palatine. As remarked above, the internal pterygoid curves around the nasal passage and establishes the lower boundary of the passage.

It is difficult to determine whether or not the back of this skull originally resembled *Lipotes* although the curvature of the maxillae as far as preserved suggests that the dorsal surface of this skull must have conformed to that type of cranium. If our interpretations are correct the temporal fossae were roofed over to a large extent by the frontal plates of the maxillae. The maxillae increase in width from the tip of the rostrum posteriorly; they attain their greatest width behind the orbit. When the maxillae reach the maxillary notches they push back over the frontals and expand laterally to form the so-called frontal plates. The outer edge of either maxilla is turned abruptly upward and is closely appressed to the internal face of the "up-ended" supraorbital process of the frontal. This maxillary crest makes a right angle with the horizontal frontal plate of the maxilla; it terminates abruptly at the posterior end of the supraorbital process for the broken edges of the horizontal frontal plate of the maxilla adhere to the base of that process on the left side of the skull.

The small fragment comprising the adjoining portions of the frontals and supraoccipital represents all that is known of the back of the skull. This fragment is very important for it shows that the vertex of the skull was not strongly elevated or at least no prominent protuberance, like in *Inia* or *Lipotes*, was present. It is also evident that the maxillae were in contact with the supraoccipital and that their internal margins overlapped the frontals on the vertex of the skull. The breadth of the combined frontals on the vertex is narrower than the greatest distance between the outer walls of the nasal passages. The posterior end of the right nasal is present; it is closely appressed to the frontal and apparently slopes obliquely forward. From this it appears that the elevation of the vertex of the skull in *Inia* and *Lipotes* has been accompanied by the nasals shifting to a vertical position and consequently becoming closely appressed to that protuberance. If one attempts a restoration of the back of the skull by following the curvature suggested by that fragment of the supraoccipital which is preserved, then the area between the lambdoidal crests was higher than wide, but otherwise bore considerable resemblance to *Inia.*

Lateral view.—A narrow rostrum equaling five times the length of the cranium, a large supraorbital process forming a high crest above the orbit, a thickened zygomatic process of the squamosal, and the absence of an elevated vertex, all contribute to the formation of a skull (pl. 2) that is unlike either *Lipotes*, *Inia*, or *Platanista.* As in other long-beaked dolphins, the rostrum is formed mainly by the closely joined maxillae and premaxillae, these elements being supported internally by the anterior extension of the vomer. More than half of the lateral aspect of the rostrum is formed by the maxilla. The premaxilla is shallower than the maxilla, decreasing in height anteriorly and near the tip of the rostrum is barely visible from a side view. The axis of the rostrum is approximately straight. In this skull and in that of *Lipotes* the rostrum is noticeably broader than deep; this feature is more evident in the former than in the latter. On the other hand the rostrum of the skull of *Inia* is relatively deeper throughout its length and appears to be bent downward.

In this specimen the lambdoidal crests were apparently the highest points of the dorsal profile; in front of these the maxillae slope forward to the rostrum. The skull as a whole is very slender, and the height at the vertex is proportionately low in comparison with that of the base of the rostrum. The alveolar gutter is visible throughout its length from a side view and terminates 118 mm. in advance of the maxillary notch. The temporal fossa as restored is relatively small and equals about twice the length of the orbit.

Above the orbit the supraorbital process of the frontal is bent abruptly upward and forms a vertical crest. The maxilla also bends upward and sheathes the internal face of this crest; the external margin of the maxilla bends over and is closely appressed to the anterior and dorsal faces. The greatest vertical depth of the left supraorbital process of the frontal is 81 mm., and the greatest length is 105 mm. The crestlike portion of the supraorbital process is reduced to a mere vestige in *Lipotes*, *Inia*, and *Platanista.*

The external face of the supraorbital process slopes obliquely upward and inward. It is " fan-shaped " in outline, the anterior and dorsal margins being evenly rounded, while the posterior margin is nearly straight, and the ventral margin is emarginate. Posteriorly, the supraorbital process is drawn out into a narrow postorbital projection which slopes downward; it thus comes in contact with the zygomatic process of the squamosal and is closely appressed to that bone. The postorbital projection is exceedingly long in *Inia* and slightly shorter in *Lipotes*, but does not extend backward to the zygoma in either of these genera. On skulls of *Inia* and *Lipotes*, the lachrymal is closely appressed to the anterior face of the supraorbital process. The lachrymal and ankylosed jugal are missing on the left side of this fossil skull. Originally the lachrymal must have been inserted between the overlapping maxilla and the anterior face of the supraorbital process, as will be shown in another part of this description.

The zygomatic process of the squamosal is greatly thickened dorsoventrally in contrast to the long attenuate zygoma of *Inia* and *Lipotes*. As a whole the zygoma is robust, curved, and rather short; the dorsal surface curves gradually forward and upward. The posterior margin of zygoma is nearly straight and forms an obtuse angle with the axis of the rostrum. Correlated with this difference is the form of the glenoid cavity and the postglenoid process. The latter is relatively thin, directed backward and downward. The greatest length of the zygomatic process along the glenoid face is 99 mm. and the greatest depth is 63 mm. On the whole the zygoma bears a much closer resemblance to *Eoplatanista italica* Dal Piaz[a] than to any living river dolphin.

Ventral view.—The ventral surface of the rostrum (pl. 1) is formed almost entirely by the maxillae which meet mesally in a linear suture in front of the vomer, and extending forward parallel each other throughout the distal three-fourths of the rostrum. All of the teeth in either tooth row are lodged entirely in the maxillae. The maxillae broaden from the tip of the rostrum to the maxillary notches. The rostrum is not narrowed between the tooth rows and the maxillary notches as in *Lipotes*. The lateral borders of the maxillae establish the margins of the rostrum and posterior to the tooth rows these margins are thin and bladelike. The rostrum is emarginate at the tip, the sides of the notch being formed by the premaxillae, small splintlike processes of which extend forward beyond the maxillae. On either side the premaxillae are not visible from a ventral view posterior to the first tooth. Posteriorly, as remarked above, the maxillae separate to allow the keel of the vomer to appear between them. This keel of the vomer is continued backward, and increasing in height, attains its maximum depth at nasal passages and then abruptly subsides.

Posteriorly the maxillae are overlain by the external pterygoids. Near the proximal end and in a middle line each maxilla comes in contact with the internal pterygoid, a flattened wedge-like bone which is in contact externally with the external peterygoid. The opening for the infraorbital canal appears in the maxillary bone in front of the nasal passages but posterior to the maxillary notch.

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[a] Dal Piaz, G., Gli odontoceti del Miocene Bellunese. Parte Quarta. Eoplatanista Italica. Memorie dell'Istituto Geologica della R. Universita di Padova, vol. 5, pl. 1, fig. 1, 1916.

On the ventral surface of the skull the vomer surrounds the prephenoid and entirely conceals it from view. It extends backward across the basisphenoid, but, since the basicranial portion of this skull is missing, the posterior limit can not be determined. The vomer is deepest at the nasal passages and in consequence this portion of the skull is characterized by a prominent keel. This keel increases in height posteriorly and attains its greatest depth immediately in front of the nasal passages; it flattens out anteriorly at the level of the last tooth. The concave areas on the maxilla on either side of this keel extend forward to the tooth rows, while in *Lipotes* they terminate 155 mm. posterior to the tooth rows.

The peculiar features and modifications of the bones surrounding the above-described keel may be compared with *Platanista* and *Lipotes*. Unfortunately, some uncertainty exists as to whether or not the type skull of the Chinese river dolphin[7] has been damaged. The irregular edges of the descending plates or fortuitous projections of the maxillae indicate that part of these bones are missing. If they were complete, they would inclose pyramidal cavities similar to those possessed by this fossil skull. The relations between the vomer, the internal pterygoids, and the palatines are essentially the same in all three genera. It should be noted that the maxillae of *Platanista* and *Lipotes* meet mesially in a linear suture at level of last tooth and thus conceal the keel of the vomer in front of the nasal passages. In this fossil porpoise the keel of the vomer appears between the maxillae.

On the left side of this fossil skull (pl. 2) the external pterygoid extends forward 112 mm. in advance of the posterior wall of the nasal passage. This bone also extends backward beyond the nasal passage; it is bounded by the maxilla anteriorly, by the squamosal posteriorly, and by the frontal superiorly. In these respects the approach is directly toward the relations existing between these bones in the skull of *Platanista* (pl. 6). One of the distinguishing features of skulls of *Platanista* and of this fossil porpoise, as compared with skulls of *Lipotes* and *Inia*, is the expansion of the external pterygoid. In consequence the alisphenoid is not exposed on the side of the skull in the temporal fossa.

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[7] Miller, G. S., jr., A new river dolphin from China. Smithsonian Misc. Coll., vol. 68, No. 9, Publ. 2486, pl. 6, Washington, 1918.

In *Platanista*, the palatines are entirely concealed by the overlying external and internal pterygoids; the latter extend forward to the level of the preorbital projection of the supraorbital process. The vaginal plate of the internal pterygoid is suturally united with the vomer posteriorly. The thin plate of the internal pterygoid curves around the nasal passage and meets the maxilla mesally; it then turns abruptly and extends forward beneath the external pterygoid. That portion of the internal pterygoid which lies anterior to the nasal passages is closely appressed to the palatine and the maxilla above; the external margin is fused with the corresponding margin of the external pterygoid. As a result a cavity is formed between the internal and external pterygoids, the opening being along the keel. When the internal and external pterygoids are removed, the palatine is exposed (pl. 5). The peculiar position of the palatine has been pointed out and discussed by Eschricht and Anderson. It has been reduced to a small elongated bone whose antero-posterior diameter is about equal to the diameter of the corresponding nasal passage. The palatine is closely appressed to the maxilla and these two bones combined form the anterior wall of either nasal passage. While similar relations between the palatine, maxilla and internal pterygoid are maintained in skulls of *Lipotes* and *Inia*, the palatine, however, is not entirely concealed by the internal pterygoid.

The similarities and differences obtaining between *Platanista* on one hand, and *Lipotes* and *Inia* on the other have been fully discussed above. Detailed comparisons have shown that the relations of the various bones in the basicranium of this fossil skull are in agreement with *Platanista*. One detail could not be satisfactorily determined from this fossil skull and that is the exact relations between the internal pterygoid and the external pterygoid near their anterior extremities.

The thickened edge of each internal pterygoid appears in the interval between the lower edge of the external pterygoid and the keel of the vomer. Slit-like apertures appear on either side between the keel of the vomer and the exposed edges of the internal pterygoids. It is possible that these apertures may be the result of distortion brought about by crushing. The pyramidal cavity which is thus formed on ether side of the keel is bounded on the inside by the internal pterygoid, on the outside by the external pterygoid, and at the rear by that portion of the former which curves around the nasal passage.

After making careful comparisons between this fossil skull and those of *Lipotes* and *Inia*, it was found that differences were observable in the size and relations of the various bones which comprise the outer wall of the cranium. In these details, however, the approach is directly toward the conditions existing in the skull of *Platanista.* In the latter, however, the position of the lachrymal with reference to the inferior opening of the infraorbital canal is somewhat different. The squamosal is relatively large, but the internal portion which forms part of the outer wall of the cranial cavity is largely missing. The lateral projection of the squamosal forms the forward projecting zygomatic process and the downward projecting postglenoid process. The left zygomatic process is complete; its greatest width is 61.5 mm. and its greatest length is approximately 100 mm. As seen from the ventral view, the zygoma is robust and short in comparison with *Inia.* On the other hand, the zygoma bears a close resemblance to that of *Platanista* and this similarity is accentuated by the contact between it and the supraorbital process of the frontal.

The glenoid surface extends forward upon the zygomatic process: it is rather wide, concave antero-posteriorly, and is limited externally and anteriorly by a distinct outer margin. The external auditory meatus, which commences at the postero-internal margin of the squamosal, apparently, does not wind around the postglenoid process of that bone for no groove can be found. The postglenoid process is directed backward and downward and does not curve forward as in *Lipotes.* The posterior portion of the glenoid articular surface of the Chinese river dolphin skull is deeply concave; in consequence the articulation with the lower jaw is restricted to a narrow area. Such is not the case with this fossil skull, for this portion of the glenoid articular surface is almost flat. On the left squamosal at the inner side of the glenoid area there is a shallow groove which commences behind the postglenoid process, but which does not extend forward to the anterior margin of the glenoid process of the squamosal as in *Lipotes.*

The origin of or possible use for a peculiar shelf formed between the upper margin of the squamosal and the frontal is difficult to explain. A similar groove is present in the skull of a young *Platanista* (Cat. No. 172409, U. S. Nat. Mus.), but this structure does not occur in *Inia* or *Lipotes.* In this fossil skull the shelf and groove (pl. 4) formed by it extends forward to the anterior margin of the supraorbital process of the frontal; it is thus bounded inferiorly by the squamosal and the external pterygoid. The groove is much shorter in the *Platanista* skull and terminates anteriorly at the level of apex of glenoid portion of squamosal; the foramen ovale opens into this groove. In the left temporal fossa of this fossil skull the external pterygoid comes in contact with the squamosal and the maxilla; these two bones combined limit its ventral expansion. Posteriorly, the external pterygoid sends a process forward and upward to meet the frontal.

Certain foramina are present in the skull of *Platanista* which are apparently absent in this fossil skull. No information regarding these foramina can be secured from the right side of the cranium for it has been completely destroyed, and the imperfect preservation of the left side may possibly explain the failure to identify these foramina there. Between the external pterygoid and the frontal there is a small opening which may represent the sphenorbital fissure.

The lachrymal is missing completely on the left side of the skull, but fragments of this bone are present on the right side. A small fragment of the lachrymal is wedged in between the maxilla and the right supraorbital process of the frontal; a horizontal, flattened, proximal piece must have filled in the space between the anterior margin of the frontal and the ventral plate of the maxilla. On the left maxilla and internal to the maxillary notch three oblique grooves are plainly visible. These grooves represent the sutures for the jugal which in turn was ankylosed to the lachrymal, as will be shown below. These three features show that the lachrymal when complete must have maintained approximately the same relations with the surrounding bones as exist in the skull of *Lipotes*.

In the skull of *Lipotes*, the lachrymal is an elongate bone which commences internally behind the opening for the infraorbital canal, and occupies the interval between the frontal and the ventral plate of the maxilla. It extends outward and its distal extremity is closely appressed to the anterior face of the supraorbital process of the frontal. The lachrymal thus forms the outer margin for the so-called maxillary notch. The jugal is fused with the lachrymal and is suturally united to the maxilla at the maxillary notch. It is thus evident that the skull of the living genus *Lipotes* and that of this fossil porpoise possess lachrymals which are essentially the same both in shape and in relation to the surrounding bones. It should be noted, however, that in this fossil skull the outer margin of the maxillary notch is formed entirely by the maxilla. The distal end of the lachrymal is very thin and is merely a wedge between the anterior face of the supraorbital process of the frontal and the maxilla.

Measurements of the skull.

	mm.
Total length (estimated)	1,195.
Length of rostrum (maxillary notches to tip of beak)	1,000.
Breadth of skull across zygomatic processes of squamosals	268.
Height of skull (basisphenoid to vertex, estimated)	122.
Height of rostrum at level of maxillary notches	80.
Total length of maxilla (estimated)	1,125.
Greatest breadth of right premaxilla in front of nares	42.
Greatest breadth of left premaxilla at maxillary notch	37.5
Breadth of rostrum at maxillary notches	155.
Breadth of rostrum at proximal end of alveolar rows	98.
Breadth of rostrum at extremity	25.
Distance between inner margins of maxillae on vertex	28.3
Greatest breadth of left supraorbital process of the frontal	105.
Greatest dorso-ventral depth of left supraorbital process of frontal	81.
Greatest breadth of braincase between temporal fossae (estimated)	106.
Length of exposed frontals on vertex	42.
Breadth of exposed frontals on vertex	23.
Length of right zygoma	100.

PERIOTIC.

In general appearance the periotic of this fossil porpoise agrees more closely with *Platanista gangetica* (Cat. No. 23456, U. S. Nat. Mus.) than with *Inia geoffrensis* (Cat. No. 49582, U. S. Nat. Mus.) It is not distinguished from that of *Platanista* by any sharply marked features other than the possession of a larger fenestra ovalis, a more elongated internal acoustic meatus, and a wider interval between the foramen singulare and the cerebral orifice of the facial canal.

The posterior process is missing as the periotic is broken just posterior to the fenestra ovalis. In case of some of the living dolphins the posterior process is frequently damaged when an attempt is made to remove the periotic bone from the skull and the destruction of the back of the cranium may account for the loss of the posterior process of the periotic of this fossil porpoise. The internal and central portion of the periotic represents the *pars cochlearis*. As a whole, this structure is obliquely compressed dorso-ventrally and is less convex than that of either *Platanista* or *Inia;* the posterior portion is slightly elevated. The fenestra rotundum is large, and internally a thin partition of bone separates it from the *scala vestibuli*. A crescentic fissure following the course of the *scala vestibuli* is present on the internal margin of this partition and this also corresponds in its position to that of *Platanista*. In this periotic the fenestra rotundum is more or less ovoidal in outline, but in a second specimen the orifice is distinctly circular. The posterior face of the *pars cochlearis* is rather abruptly truncated above the fenestra rotundum.

The fenestra ovalis is relatively much larger than in *Platanista*, oval in outline, and extends downward upon the lateral face of the periotic. No stapes is present and it is evident that this element did not completely fill the fenestra ovalis with its foot plate. In this feature also this periotic agrees with *Platanista*, for in the latter the foot plate of the stapes is held in position by an annular ligament. The foot plate of the stapes completely fills the fenestra ovalis in the periotic of *Inia* and is firmly lodged. The groove for facial nerve leads directly to the epitympanic orifice of the facial canal as in *Inia* and thus differs from the type of groove present in *Platanista*. Only that portion of the fossa for the stapedial muscle which extends downward on the external face of the *pars cochlearis* is preserved on this periotic, the remainder having occupied the process which is missing. A characteristic feature of the tympanic face of this periotic is the large swollen tuberosity on the anterior process. The fossa for lodging the head of the malleus is large, rectangular in outline, and situated in the same relative position as in *Platanista* and *Inia*, but extends inward beyond the epi-tympanic orifice of the facial canal. A rather deep but narrow groove for the external auditory tube appears to have been present between the above-mentioned tuberosity and the posterior process. The anterior end of the *fossa incudis* is present.

The anterior process is rather long and is directed obliquely inward; it is thickened dorso-ventrally and compressed laterally, but its ventral and dorsal surfaces are curved and form a bluntly pointed apex at the antero-ventral angle. On the external face of the anterior process is a deep V-shaped groove or crease. An elongate concave articular facet occupies a considerable portion of the ventral face of the anterior process; this facet supports the outer lip of the tympanic bone. It is possible for the uncinate process or accessory ossicle of the tympanic bulla to curve around the posterior face of the anterior process of the periotic (pl. 7, fig. 6), paralleling conditions present in that of *Platanista* (pl. 7, fig. 5) and thus differing from that of *Inia*. In the last mentioned genus the accessory ossicle is lodged in a depression in front of the fossa for the head of the malleus.

The resemblance between the periotic of this fossil porpoise and that of *Platanista* is even more striking when these bones are viewed from the cerebral side. The *tractus spiralis foraminosus*, the cerebral orifice of the facial canal, and the foramen singulare all lie within a common fossa, which is compressed anteriorly and pyriform in general outline. The *tractus spiralis foraminosus* is well defined and at the end of the spiral is the foramen centrale. Anterior and internal to the *tractus spiralis foraminosus* is the cerebral orifice of the facial canal. The position of the foramen singulare corresponds more closely with *Inia* than with *Platanista.* In the latter, the foramen singulare is present as a minute opening on the posterior wall of the facial canal. In the periotic of this fossil porpoise, the foramen singulare is situated relatively nearer to the spiral tract although a low partition separates these structures. The cerebral orifice of the *aquaeductus vestibuli* is of moderate size and elongate; the orifice is situated external and slightly posterior to the internal acoustic meatus as in *Platanista.* A narrow isthmus of bone lies between the cerebral orifice of the *aquaeductus cochleae* and the fenestra rotundum; the canal is relatively large. In both *Inia* and *Platanista* the *aquaeductus cochleae* and its cerebral orifice are very minute. The cerebral orifice of the aquaeduct of the cochlea in this fossil periotic is situated 2.6 mm. from the internal acoustic meatus and at least 4.5 mm. from the same orifice of the *aquaeductus vestibuli.* The *pars vestibularis* is relatively small, with the exposed faces rounded, and largely concealed ventrally by the processes which arise from it.

Measurements of the periotic bone.

	mm.
Greatest length of periotic (tip of anterior process to broken posterior margin)	33.5
Greatest depth of labyrinthic region of the periotic	11.5
Greatest breadth of labyrinthic region of the periotic	19.5

TYMPANIC.

Neither one of these two tympanics is entire. The thin brittle outer lip which arches over the involucrum and the slender processes which project from it are frequently damaged when the tympanic is broken away from the periotic, even in case of the living purpoises. Since the processes which join the tympanic to the periotic are very slender, one may expect to find many broken and otherwise imperfect tympanic bones.

The left tympanic is badly broken, and some of the missing pieces were not found in the matrix. The fragments which were found have been fitted together (pl. 7, fig. 2), but no restoration has been attempted. Comparisons were made with the tympanic bones of some 20 genera of living dolphins and only 1 genus, *Platanista* (pl. 7, fig. 1), exhibited any marked agreement. The tympanic bones of this fossil porpoise and *Platanista* are very similar in general features, even to the matter of size. Among the other living dolphins available for comparison, *Inia* showed the closest approach to this type of tympanic. It is unfortunate that the type skull of *Lipotes vexillifer* lacks both tympanic and periotic bones.

Although imperfect, the left tympanic bone of this fossil porpoise is sufficiently entire to show the size and direction of the anterior outlet or the tympanic aperture of the eustachian canal. The anterior end of the tympanic is drawn out into a narrow laterally compressed process which is directed forward and downward. This process is missing on the right tympanic (pl. 7, fig. 4), but the thin outer lip is practically entire. In *Platanista* (pl. 7, fig. 3) the inferior margin of the outer lip of the bulla turns abruptly and curves inward, forming a shelf. This modification, apparently, was not present on the tympanic of this fossil porpoise.

The tympanic cavity, which is bounded by the overarching outer lip and by the involucrum, is essentially similar to that of *Platanista*. The anterior process of the tympanic, which unites with the periotic, is broken off at the level of the outer lip. When viewed from the external side, the posterior margin of the tympanic is seen to be more rounded than in *Platanista*, the *processus sigmoideus* is longer, and the tympanic as a whole is relatively deeper. The *processus sigmoideus* of the right tympanic (pl. 8, fig. 2) is entire, the terminal half being twisted at right angles to the basal. The groove on the external face of the tympanic anterior to the *processus sigmoideus* is relatively broader than in *Platanista* (pl. 8, fig. 1). The so-called posterior conical apophysis is shorter than in *Platanista*, but otherwise the relations between this apophysis and the *processus sigmoideus* are essentially the same in both genera. The apophysis projects above the level of the superior face of the involucrum.

The posterior process (pl. 7, fig. 2) is broken off at the level of the involucrum. The broken edges show that it projected from the posterior end of the tympanic and that the outer lip and the involucrum contributed to its formation as in *Platanista*. The thick convex involuted portion of the tympanic is slightly and unequally depressed below the level of the overarching outer lip and subsides rather abruptly just posterior to level of the anterior process of the outer lip, while the anterior portion becomes decidedly concave internally. The surface of the thickened or posterior portion of the involucrum is constricted or depressed medially on its internal and dorsal faces.

The ventral surface of the tympanic exhibits a deep groove which is most pronounced near the posterior margin. In *Platanista* (pl. 8, fig. 3), however, this groove is not open, but is filled in with spongy bone. When viewed from the ventral side the outer margin of the bulla (pl. 8, fig. 4) is seen to be biconvex and much broader anteriorly than in *Platanista*. The anterior and posterior margins of the bulla do not slope as strongly from the external to internal faces as they do in the living genus.

In regard to the slight differences which are observable in the tympanic and periotic bones of this fossil porpoise and *Platanista*, one is encouraged to conclude that there must be a closer relationship existing between these dolphins than with the Delphinidae.

Measurements of the tympanic.

	mm.
Greatest length of left tympanic bulla	52.5
Greatest width of right tympanic bulla	27.6
Greatest depth of right tympanic bulla on internal side	20
Greatest depth of right tympanic bulla on external side (ventral face to tip of *processus sigmoideus*	36.5

MANDIBLES.

One distinguishing feature of the combined lower jaws (pl. 3) of this fossil porpoise, as compared with jaws of *Platanista*, *Inia*, and *Lipotes*, is the great length of the symphysis. The free portion of either mandible is less than one-third of its total length. The combined lower jaws taper toward the tip, the width at the proximal end of the symphysis being equal to more than four times the width at extremity. The depth of either mandible at proximal end of the symphysis is nearly three times that at the extremity. There is a conspicuous median longitudinal groove between the tooth rows on the posterior one-half of the symphysis. The distance from the symphysis to last tooth is much less than distance between same tooth of opposite rows.

Back of the symphysis the ramus consists mainly of a thin shell of bone. The external wall of the ramus is continued backward to form the coronoid process, the condyle, and the angle. The internal wall of the right ramus terminates 183 mm. behind the symphysis; at this point the inferior dental canal enters the mandible. Between the symphysis and the terminus of the internal wall the ramus is hollow; the depth of the cavity at the proximal end as estimated is equal to approximately four times that at the symphysis.

The superior margin of the mandible gradually rises from the symphysis to the coronoid, and is accompanied by a downward curvature of the inferior margin. In consequence the coronoid as originally preserved was deep and somewhat convex on the external face. As a result of crushing, the posterior one-third of both mandibles show a longitudinal fracture at the level of the condyle. The lower portions of each of these mandibles as shown on plate 3 are thus pushed inward and lie in a horizontal position. For this reason some allowance must be made in estimating the depth of the mandible at the coronoid. It appears that the depth through the coronoid (185 mm. estimate) is equal to less than one-half of the free portion of the left mandible. The coronoid is broadly rounded, while the angle is abruptly truncated. The condyle is large, flattened, and slopes obliquely backward; the external margin projects laterally beyond the plane of the coronoid.

When viewed from the ventral side (pl. 3) the symphysial region is seen to be much broader than that of *Lipotes*. A pair of longitudinal grooves incloses a raised ridge which diminishes in height and in width anteriorly. Eight or more foramina open into each of these grooves. The grooves extend forward to the tip of the symphysis, but on the distal 75 mm. they are reduced to very narrow channels. Posteriorly, they extend backward a short distance beyond the symphysis.

Measurements of the mandibles.

	mm.
Length of right mandible (condyle to tip)	1,097.0
Length of left mandible (condyle to tip)	1,120.0
Greatest breadth of combined mandibles at extremity	18.0
Greatest depth of combined mandibles at extremity	9.3
Greatest breadth of combined mandibles at proximal end of symphysis	90.0
Greatest depth of combined mandibles at proximal end of symphysis	27.0
Greatest depth of right mandible at level of proximal alveolus	21.5
Greatest depth of left mandible at level of proximal alveolus	21.7
Greatest length of ankylosed symphysial portion of ramus	803.0
Length of right alveolar row	820.0
Length of left alveolar row	845.0
Depth of mandible at coronoid (estimated)	135.0
Depth of condyle of left mandible	45.0

TEETH.

The anteriormost pair of teeth on the rostrum is considerably larger than any of the following teeth, but the form of the crown and the character of the enamel are essentially the same in all of the teeth preserved. Nineteen teeth are in place on the right side of the rostrum. Of the mandibular teeth 13 are in place on the right side and 12 on the left side. The alveoli are distinct and anteriorly are arranged in pairs. The alveoli number 87 on the right side and 86 on the left side of the rostrum; 70 alveoli are present on the right and 72 on the left mandible.

The total number of teeth present originally was about 315, of which 45 or about one-ninth are preserved. This fossil skull possessed more than twice as many teeth as an average *Platanista* skull; the anterior teeth are relatively shorter than the same teeth of *Platanista* and all project strongly beyond the sides of the rostrum and lower jaws. The teeth of *Lipotes* project to some extent beyond the sides of the rostrum and mandibles, more so than in *Inia*, but not so strongly as in this fossil skull. The anterior teeth of this fossil skull are noticeably larger and longer than the posterior teeth. The second tooth on the left side possesses the longest enamel crown (10 mm.), while the first tooth on the right side has the broadest crown (5 mm.). The smallest tooth has an enamel crown 7 mm. long and a maximum diameter of 3 mm.

Skulls of *Lipotes* and *Inia* possess teeth whose enamel crowns are strongly rugose. The surfaces of the enamel crowns of these fossil teeth are ornamented with fine longitudinal striae; those of a young *Platanista* skull are smooth. In case of old individuals of *Platanista* the enamel crowns of the teeth almost always show the effects of wear and on many of the teeth the enamel is entirely missing. The crowns of the teeth of this fossil porpoise and those of *Platanista* are compressed antero-posteriorly. There is no well defined neck between the expanded portion of the root and the enamel crown. The swollen part of the root of many of the teeth has a greater diameter than that of the crown. There is no indication of a cingulum. The distal extremities of the roots are slender, elongated, and curved backward. The mandibular teeth are similar to the maxillary teeth in form, but the crowns of the posterior teeth are relatively smaller.

HYOID BONES.

The hyoid bones bear some resemblance to those of the Delphinidae, especially *Phocaena*. Although the basihyal and the two thyrohyals are ankylosed (pl. 9, fig. 1), the sutures between the component parts are apparent. The central portion (basihyal) is strongly compressed dorso-ventrally and possesses two short, anterior, conical projections (ceratohyals) which were joined in front by cartilage with the elongate stylohyals. The expanded lateral wings (thyrohyals) of the hyoid bone curve backward and upward, but their distal ends are bent downward. These thyrohyals are subcrescentic in outline, relatively thin, concave superiorly, and convex inferiorly. Internally there is a slight elevation or ridge which marks the line of fusion of thyrohyal with the basihyal. The antero-external margin of either thyrohyal is recurved and to it were attached the stylohyoid ligaments.

The ankylosed basihyal and the two thyrohyals of this fossil porpoise are similar in some respects to those of *Inia geoffrensis*. They differ widely from the figure given by Anderson[8] for those of *Platanista*, which shows the thyrohyals dilated at their basihyal ends instead of mesially, the presence of free elongate rodlike ceratohyals, and the absence of posterior projections on the basihyal. Small posterior projections are present on the basihyal of this fossil hyoid.

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[8] Anderson, J., Anatomical and Zoological Researches: Comprising an account of the Zoological Results of the Two Expeditions to Western Yunnan in 1868 and 1875. London (1878), p. 528 pl. 40, fig. 20. 1879.

The stylohyals (pl. 9, figs. 2–3) are decidedly more like those of *Inia* than those of *Platanista*. Each is an irregular elongate bone, slightly curved upward and suddenly curving forward at the distal end. The anterior edge for its greater part is rounded and the posterior margin compressed so that a cross section of the stylohyal would be somewhat ovoidal. These bones are nearly a third again as long and twice wider than are the flattened stylohyals of *Inia geoffrensis*.

Measurements of the hyoid bones.

	mm.
Greatest length of central portion (basihyal)	36.0
Antero-posterior width across ceratohyals (outside measurement)	36.5
Greatest thickness of thyrohyal at distal end	9.0
Greatest breadth of thyrohyal	49.0
Greatest length of thyrohyal (postero-internal margin to tip)	107.5
Greatest length of left stylohyal	153.5
Greatest breadth of left stylohyal	21.5

CERVICAL VERTEBRA.

All of the cervical vertebrae except the atlas are missing. The atlas is complete and agrees in some respects with the cervical described by Cope and by Case[9] as *Priscodelphinus grandaevus*, but is much larger. While agreeing with the atlas of *Inia geoffrensis* in the presence of both upper and lower transverse processes, it differs in many details of form, some of which may be attributed possibly to individual variation. The atlases of *Lipotes* and *Platanista* have lost the upper transverse process (diapophysis) and the lower one (parapophysis) is considerably shorter. In the living river dolphins a free atlas is accompanied by separated cervicals.

This fossil atlas is relatively deep antero-posteriorly, the length (66 mm.) being about one-half of the greatest breadth (113.5 mm.) across the anterior articular facets. The facets for the occipital condyles (pl. 12, fig. 4) are concave, broader above than below, and inclined obliquely outward. They are separated inferiorly by a rather wide interval (18 mm.). The neural arch is not strongly elevated and is broad antero-posteriorly. On either side the neurapophysis (pl. 8, fig. 5) is pierced by a large elliptical vertebraarterial canal. The neural arch may have borne a low, blunt spine for a longitudinal rugose area which appears to represent its base is present.

The upper and lower transverse processes project backward. The upper transverse process is broad and flattened dorso-ventrally; the posterior margin is rounded while the anterior is thin and blade-like.

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[9] Case, E. C., Miocene Text, Maryland Geol. Surv., Baltimore, p. 15, pl. 12, figs. 1*a*, 1*b*, 1*c*, 1904.

On the dorsal surface of the upper transverse process and adjacent to the large canal is a depressed area. A small circular foramen connects this area with the vertebrarterial canal, and may represent the foramen for the exit of the spinal nerve. The lower transverse process is rounded and attenuated.

The posterior articular facets (pl. 12, fig. 3) for the axis are elongate with nearly straight vertical external margins and are indistinctly set off from the posterior face of the centrum. The hyapophysial process is short, thick, and irregularly pitted or roughened.

Measurements of cervical vertebra (in millimeters).

Greatest depth (vertically) of vertebra (tip of neural spine to inferior face of centrum)	89.5
Anterior breadth of spinal canal	53.5
Median depth of spinal canal (anteriorly)	47.0
Distance between tip of one lower transverse process (parapophysis) and tip of opposite one	121.0
Greatest distance across vertebrae between outside margins of anterior articular facets	113.5
Greatest height of articular surface for condyle	53.2
Greatest breadth of articular surface for condyle	30.0
Distance across vertebra between tips of upper transverse processes (diapophyses). (Outside measurement)	131.0
Greatest length of superior face (neurapophysis) of vertebra	37.5
Greatest diameter of vertebrarterial canal	14.2
Distance from anterior face (inferiorly) to tip of spinous process (posteriorly)	39.0
Greatest length of lateral face of vertebra	67.5
Distance from tip of upper transverse process (diapophysis) to tip of lower transverse process (parapophysis). (Outside measurement)	64.0

DORSAL VERTEBRAE.

Comparisons have been made between this vertebral column (pl. 10) and those of *Inia geoffrensis* (Cat. No. 49,582, U.S.N.M.) and *Platanista gangetica* (Cat. No. 172,409, U.S.N.M.) Ten dorsal vertebrae are preserved and represent a continuous series. With the exception of the fourth dorsal (pl. 13, fig. 2) which lacks the anterior epiphysis, all of them are practically complete. The dorsals differ noticeably from those of *Inia* and to a less extent from those of *Platanista.* Unfortunately the only skeleton of *Platanista* available for comparison belongs to a young individual. The vertebral column of *Inia* includes thirteen dorsals and three lumbars while that of *Platanista* includes ten dorsals and eight lumbars. As remarked above ten dorsals are known for this fossil porpoise and in addition it possessed at least four lumbars.

These dorsals differ noticeably from all the dorsal vertebrae described by Cope and Leidy, not only in size, but also in structure. They also differ from many recent delphinoids in that the neural spines are nearly vertical instead of being strongly inclined backward or forward (*Inia*). In the first three dorsals the antero-posterior diameter of the spine at the tip is somewhat less than at the base, this being especially noticeable in the first dorsal. The neural spines of the remaining dorsals, however, are of approximately the same depth throughout. In this respect they resemble the dorsals of *Platanista* more closely than those of *Inia* or any other recent species available for comparison.

The anterior dorsal vertebra of this fossil porpoise presents the majority of those features which characterize the first dorsals of *Inia geoffrensis* and *Platanista gangetica.* This vertebra agrees with that of *Inia* in the general appearance of the transverse process and the position of the articular facet for the tuberculum of the first rib, but differs in the great depth of the centrum and the relative width and height of the neural spine.

The anterior dorsal is peculiar as regards the dimensions of the centrum which is almost as long as broad. The epiphyses are relatively thin. There is a distinct oval facet for the accommodation of the head of the second rib on the postero-superior lateral margin of the centrum. The neural arch is low, broad, and thin, with a lateral transverse process on each side which bears an articular facet for the accommodation of the tuberculum of the first rib. The articular facet on the transverse process for tubercle of rib is horizontal, that is it is situated on the inferior face of this process. If any reliance can be placed on the position of this articular facet, then this is actually the first vertebra of the dorsal series.

Compared with the same vertebra in a young *Platanista* skeleton, the principal differences are as follows: The centrum is longer, but not so compressed dorso-ventrally; the neural canal is much larger; and the posterior margin of the neural spine is more arcuate.

In this fossil series of dorsals, the centra increase perceptibly in length from the first to the last. The prezygapophysial facets of the first six dorsals are nearly horizontal in position while those of the last four (pl. 13, fig. 1) are oblique. In the first six dorsals the articular surface for the accommodation of the postzygapophysis is circular; in the others this surface is nearly oval. These facets for the postzygapophyses (pl. 13, fig. 2) are situated on the superior face of the upturned margin of the laminae in front of and below the point where the metapophyses arise. As we go backward along the series they gradually shift from a horizontal to a lateral position.

The prezygapophysial facets are wider apart and are more divergent than the postzygapophysial facets (pl. 14, fig. 2). The metapophyses project beyond the epiphyses of the centrum throughout the series while in the case of the postzygapophyses, with the exception of the first four dorsals, such is not the case. The metapophyses also rapidly increase in size from the seventh to the tenth dorsals and beginning with the seventh dorsal project obliquely upward.

The second and third dorsals are very similar in appearance to the first. The most apparent differences are the increase in distal width of the neural spines and the shifting of the articular facet for tubercle of rib to a more lateral position on the transverse process.

The fourth (pl. 13, fig. 3), fifth, and sixth dorsals possess deep neural spines and their anterior and posterior margins are slightly curved. The transverse processes are well developed and project forward in the first six dorsals. Anteriorly they arise high up on the neural arch and when followed back gradually shift their position on the vertebrae until on the tenth dorsal they project from the middle of the centrum. On the tenth dorsal, the transverse process and its articular facet for the tuberculum of rib are directed backward. The external face of the transverse process is deeply excavated, furnishing a broad concave articulating surface for the accommodation of the tuberculum of the corresponding rib. On either side of the centrum of the first six dorsals, just anterior to the posterior epiphysis, is a circular digital depression for the accommodation of the capitulum of the following rib. On the eighth dorsal (pl. 13, fig. 4) the articular facet for the capitulum lies just below that for the tuberculum. A corresponding facet is not present on the last two dorsals for the ribs articulate solely with the transverse processes.

The facets for the tubercles of the ribs increase in width from the first to seventh dorsals, and gradually shift in position until on the seventh dorsal the facet is behind the level of the anterior epiphysis of centrum. On the anterior dorsals the facet for the tubercle projects in front of the anterior epiphysis. The lateral transverse process which bears the articular facet for tubercle of rib and which internally is continuous with metapophysis increases in size from the first to seventh dorsal. The transverse process drops down to the level of the centrum on the eighth dorsal. The neural canal is roughly semicircular in outline inferiorly, but above, owing to the depression of the neurapophyses, it is pointed, as shown in plate 13, figure 2. The anterior articulating surfaces of the centra are convex, while the posterior faces are slightly concave.

Measurements of dorsal vertebrae (in millimeters).

	1	2	3	4	5	6	7	8	9	10
Greatest depth (vertically) of vertebra (tip of neural spine to inferior face of centrum)	168.0	173.0	183.5	187.5	187.0	190.0	186.0	180.5	184.0	193.0
Greatest depth of spinal canal anteriorly	30.0	24.0	x	25.0	x	x	x	30.0	26.5	x
Greatest breadth of spinal canal posteriorly	x	x	38.0	33.0	x	x	x	27.0	29.0	x
Height anterior face of centrum	43.0	44.5	42.0	[1] 47.5	44.5	44.5	48.0	52.0	54.0	58.0
Breadth anterior face of centrum	62.0	58.0	58.0	[1] 56.0	59.0	x	x	64.0	62.5	x
Height posterior face of centrum	42.6	44.0	45.5	47.5	47.5	53.0	55.0	54.5	59.0	x
Breadth posterior face of centrum (including facet)	72.2	71.0	73.4	70.0	71.0	x	x	66.0	x	x
Greatest length of centrum	56.0	57.5	60.5	[1] 63.0	70.5	77.0	80.0	86.0	90.0	9
Distance across vertebra between tips of the transverse processes	152.4	136.0	116.6	114.0	x	x	x	97.0	x	x
Distance across vertebra between tips of the prezygapophyses	x	x	x	x	x	x	x	[2] 46.0	x	x
Distance across vertebra between tips of the postzygapophyses	[2] 84.0	[2] 67.0	47.5	44.0	x	x	x	[2] 26.5	x	x
Distance between tip of left postzygapophysis and tip of left prezygapophysis	85.0	83.5	82.5	85.0	93.0	95.0	99.0	103.0	107.0	x
Minimum length of neurapophysis	26.0	29.0	36.0	38.0	45.0	43.7	53.0	53.0	52.0	52.5
Antero-posterior breadth of neural spine in a horizontal line immediately above the zygapophyses	65.5	61.5	x	58.0	60.0	62.5	75.0	74.0	73.0	74.0
Antero-posterior diameter left diapophysis at extremity	31.0	37.5	38.0	34.5	32.0	36.5	37.0	34.0	27.0	35.0
Vertical height of neural spine (distance between superior margin of spinal canal and tip of spine	87.5	96.0	115.5	117.0	111.0	107.0	103.0	97.0	87.0	106.0

[1] No epiphysis.

[2] Estimated.

LUMBAR VERTEBRAE.

Four lumbar vertebrae (pl. 10, Nos. 12–15) are preserved, but two are incomplete; the second lacks the posterior end of the centrum and its epiphysis, and of the third only the neural spine remains. The centra of two of these lumbar vertebrae, one of which is practically complete with the exception of some defects due to crushing, were utilized in restoring the second vertebra of the series. They are all considerably longer than broad, and, although the fourth lumbar is the longest, no conspicuous increase in the length of the centra between the first and fourth is apparent. The centra are roughly cylindrical in outline. Inferiorly the centra of the first and second lumbars show a tendency to develop a median keel. This is evidenced by depressed areas on each side of the centrum below the transverse processes. The fourth centrum has a well developed keel which is more pronounced at the middle than at either end. A pair of grooves meeting mesially at the keel and directed obliquely outward and backward pass below the posterior margin of the transverse process and characterize the fourth lumbar.

The neural spines of the vertebrae of this fossil porpoise, if they were arranged in regular serial order and position would describe a gentle curve arising from the first dorsal and declining from the fourth lumbar. These neural spines, viewed laterally, are strongly flattened, rather squarely truncated on their upper extremities, and vertical in position. The neural arch is preserved on three of the four lumbars. The arch is very broad antero-posteriorly, with concave anterior and posterior margins. The posterior margin of the neural spine is slightly concave. The spine is broader anteroposteriorly than the neural arch, and slightly expanded at the tip. The metapophyses are situated a little nearer to the free edge of the spine than to the centrum and are directed obliquely upward and forward.

There is no distinct process for the prezygapophysis. The prezygapophysial facets (pl. 15, fig. 6), which are formed on the superior face of the upturned margin of the laminae in front of and below the point where the metapophyses arise, are concave, and look upward, inward, and forward. The postzygapophyses are laterally convex, and look downward, outward, and backward, but do not overhang the posterior face of the centrum. The transverse processes (pl. 10, Nos. 12–13) are broad, flattened, and project horizontally outward. They are also moderately long, very thin, and expanded (pl. 10, No. 15) at the distal end. This type of lumbar characterizes the genus *Platanista.*

Measurements of lumbar vertebrae (in millimeters).

	1	2	3	4
Greatest depth (vertically) of vertebra (tip of neural spine to inferior face of centrum)	196	211	x	242.0
Height of anterior face of centrum	57	61	x	69.0
Breadth of anterior face of centrum	x	x	x	78.0
Height of posterior face of centrum	62	x	x	72.0
Breadth of posterior face of centrum	x	x	x	82.0
Greatest length of centrum	103	111	x	123.5
Distance across vertebra between tips of the transverse processes (as preserved)	277	x	x	261.0
Distance between the tip of left post-zygapophysis and tip of left pre-zygapophysis (as preserved)	x	x	x	144.0
Minimum length of neurapophysis	x	55	x	63.0
Antero-posterior breadth of neural spine in a horizontal line immediately above the zygapophyses	76	80	x	99.0
Antero-posterior diameter of left transverse process at extremity	x	58	x	90.0
Vertical height of neural spine (distance between superior margin of spinal canal and tip of spine)	108+	119	x	148.0

CAUDAL VERTEBRAE.

Only three caudal vertebrae have been preserved and they belong near the distal end of the series. In form they somewhat resemble the caudals of *Inia geoffrensis* though the vertebral canals are relatively larger than in *Inia.* The largest of these caudals (pl. 18, fig. 5) is almost circular in outline, while the remaining two (pl. 18, figs. 6–7) are smaller and somewhat flattened dorso-ventrally. The sides of both of the last-mentioned caudals are grooved.

All of these caudals are pierced dorso-ventrally by two large vertebral canals. On the ventral face of the largest caudal (pl. 17, fig. 1) there are two openings for each vertebral canal of which the external ones are nearly closed. The double keels on the ventral face of the largest caudal are approximately parallel and inclose a narrow concave area. The vertebral canals converge ventrally and in the small terminal caudals (pl. 17, figs. 2–3) open only into the longitudinal depressed area. The ventral openings of these canals are partially concealed by overhanging bony shelves. The dorsal openings of the vertebral canals (pl. 17, figs. 4–6) are large and wide apart.

The presence of a pair of neurapophyses on the largest caudal shows that all of the caudal vertebrae with the exception of the terminal ones possess a neural arch. The neurapophyses of the largest caudal (pl. 17, fig. 4) converge mesally and partially close the neural canal posteriorly. The anterior articulating surfaces of the caudals (pl. 18, figs. 5–7) are concave, while the posterior are convex.

Measurements of caudal vertebrae (in millimeters.)

	Pl. 18, Fig. 5.	Pl. 18, Fig. 6.	Pl. 18, Fig. 7.
Height of centrum anteriorly	63.0	58.0	47.0
Breadth of centrum anteriorly	58.5	54.0	61.0
Height of centrum posteriorly	53.5	45.5	47.5
Breadth of centrum posteriorly	54.0	50.0	58.0
Greatest thickness of centrum	52.0	43.5	39.0

Chevron bones.

Four chevron bones were found in the matrix surrounding the skeleton. One of them (pl. 18, fig. 1) is small, elongated, and relatively low. Another (pl. 18, fig. 2) which belongs farther back is somewhat deeper and broader. The chevrons have elongated flattened surfaces for articulation with the corresponding facets on the caudals. The free margin forms a narrow posterior projection and a blunt anterior projection.

RIBS.

The whole, or portions, of 16 ribs are preserved. Only one of the ribs was found associated with the corresponding vertebra; the others lay in a tangled pile alongside of the anterior lumbars. Eight of them (pl. 10) were left undisturbed when the slab in which they were imbedded was prepared for exhibition; the others were freed from the matrix.

This fossil porpoise possesses 10 ribs on each side, of which the first is the shortest. The ribs rapidly increase in length from the first to the sixth (pl. 16, fig. 5), which is the longest, and then decrease in length to the tenth (pl. 16, fig. 7). The convex external curvature of the shafts of the three anterior ribs is less pronounced than in the others; this curvature rapidly increases posteriorly, reaching its maximum development in the fifth, sixth, and seventh ribs. The curvature of these last-mentioned ribs is very nearly the same. All of the ribs show at their distal end provision for the attachment of cartilages. The capitula of the first to the seventh ribs are borne upon long necks and the length of the necks increase as we go backward along the series to the seventh. On the eighth, ninth, and tenth ribs the capitulum and tuberculum are fused with each other.

The first seven pairs of ribs have capitula articulating with the centra, as well as tubercula articulating with the transverse processes; in the three posterior ribs, however, the articulation is limited to the transverse process. Four pairs of ribs are connected by cartilage with the sternum in *Platanista* and similar relations may have been maintained in this fossil porpoise.

The first three ribs are greatly compressed and their proximal portions are bent at right angles to the shafts. The first rib (pl. 16, fig. 1) is short, flattened, and thickest at its distal extremity; the capitulum is borne upon a relatively long flattened neck which is strongly constricted behind the capitulum. The tuberculum and capitulum are relatively small. The second rib (pl. 16, fig. 2) is longer than the first, with narrower shaft and neck. The capitulum is larger than the tuberculum. The third rib is characterized by a longer shaft and the neck, while flattened, is even thicker than the second.

The angle formed by the neck with the shaft of the succeeding ribs becomes less and less acute until in the posterior ones it almost disappears and the ribs are regularly curved. The ninth and tenth ribs (pl. 15, fig. 4–5) retain only vestiges of the angle in the form of a slight swelling below the fused tuberculum and capitulum.

The fourth, fifth, sixth, and seventh ribs are all very much alike. The differences consist of a constant narrowing of the shaft at the angle as we go backward from the fourth (pl. 16, fig. 3) to the seventh ribs, and in addition there is a tendency toward the lengthening of the interval between the capitulum and the tuberculum. The seventh rib (pl. 15, fig. 2) is larger and heavier than any of the others.

In this fossil porpoise the long necks and the distinct capitula do not disappear until the eighth rib (pl. 15, fig. 3) and up to this point are well developed. Upon the eighth rib the tuberculum and capitulum disappear as separate facets. The posterior face of this single facet on the eighth and ninth ribs is indented by a well-marked concavity. The position of this concavity suggests that the neck has been shortened and in consequence the capitulum and the tuberculum have coalesced. If this determination is correct, then the capitulum has not been lost as some writers have held. The eighth and ninth ribs are very much alike except that the former is more convex. The shaft of the tenth rib does not curve as much as the anterior ribs.

Measurements of ribs (in millimeters).

	First rib, right.	Second rib, right.	Third rib.	Fourth rib, right.	Fifth rib, right.	Sixth rib, right.	Seventh rib, left.	Eighth rib, left.	Ninth rib, left.	Tenth rib, right.
Total length in a straight line.	196.5	294.0	x	*418	430.0	482.0	466.0	419.5	407.5	344.0
Greatest breadth at angle....	41.0	37.5	x	32	32.0	30.0	29.0	22.0	22.0	22.0
Greatest breadth at inferior extremity................	34.0	26.0	x	x	25.0	13.5	14.0	x	14.0	16.0
Distance between external margin of tubercle and head.....................	60.5	67.0	x	61	62.5	65.0	65.0	†26.0	†23.5	†22.5
Greatest thickness of rib near the middle...............	14.0	13.5	x	17	18.5	17.5	19.5	18.5	18.0	15.5
Greatest thickness at the inferior extremity..........	21.0	17.5	x	7	5.0	4.5	4.5	3.0	3.5	5.5

* As preserved, incomplete. † Breadth of articular face.

STERNUM.

Although the presternum (pl. 11, fig. 1) of this fossil porpoise is crushed and incomplete, it is evident that it must have resembled *Platanista* when perfect. In size it approaches the presternum of *Inia*, but there are no traces of conical processes behind the articular surfaces for the first ribs. The anterior extremity is imperfectly preserved and both angles are missing. The presternum is larger than that of *Platanista* and smaller than that of *Inia;* the posterior extremity is abruptly truncated. The breadth of the presternum posteriorly (52 mm.) equals about one-half of the mesial length (113 mm.). The external margins are rounded and the bone, as a whole, is relatively thick (greatest thickness 24.5 mm.). The articular surfaces for the second ribs are situated on the external face and at the posterior end of the presternum, and not on the posterior face as in *Platanista.*

A pair of curved plate-like bones (pl. 11, fig. 2) which are united on their antero-internal margins may represent the mesosternum. Such a type of mesosternum would be somewhat unusual. The mesosternum of *Platanista* is composed of two flattened bones which are in contact for their entire length.

PADDLE BONES.

Although the phalanges (pl. 9, fig. 4) have been arranged in accordance with the position of similar phalanges in the paddle of *Inia geoffrensis*, no assurance can be given that this arrangement is correct. These bones were found intermingled with other parts of the skeleton and may represent parts of both paddles.

EXPLANATION OF PLATES.

Zarhachis flagellator Cope. Cat. No. 10485, Division of Vertebrate Palaeontology, United States National Museum. Calvert formation, western shore of Chesapeake Bay, about one-half mile south of Chesapeake Beach, Calvert County, Maryland. Collected by Norman Boss, August 8, 1921.

PLATE 1.

Skull of *Zarhachis flagellator* Cope. About ⅕ natural size. Upper figure. Dorsal view; Lower figure. Ventral view. The posterior end of the skull has been restored. Abbreviations: *Ex. pt.*, external pterygoid; *Fo. inf.*, infraorbital foramen; *Fr.* frontal; *In pt.*, internal pterygoid; *Max.*, maxilla; *Max. cr.*, maxillary crest; *N. A.*, external nasal aperture; *Na.*, nasal; *Pmx.*, premaxilla; *Po. gl. p.*, postglenoid process of squamosal; *Po. p.*, postorbital projection of frontal; *Pr. p.*, preorbital projection of frontal; *Prs.*, presphenoid; *So.*, supraoccipital; *S. or. pr.*, supraorbital process of frontal; *V.*, vomer; *Zyg.*, zygomatic process of squamosal.

Plate 2.

Skull of *Zarhachis flagellator* Cope. Lateral views. Upper figure, Distal end of rostrum; Middle figure, Section of skull. Lower figure, Entire skull, about ⅕ natural size. Abbreviations: *Ex pt.*, external pterygoid; *Fo. inf.*, infraorbital foramen; *Max.*, maxilla; *Pmx.*, premaxilla; *Po. gl. p.*, postglenoid process of squamosal; *Po. p.*, postorbital projection of frontal; *S. or. pr.*, supraorbital process of frontal; *V.*, vomer; *Zyg.*, zygomatic process of squamosal.

Plate 3.

Mandibles of *Zarhachis flagellator* Cope. Upper figure, Ventral view of mandibles; Lower figure, Dorsal view of mandibles. About ⅕ natural size. Abbreviations: *Ang.*, angle; *C.* condyle; *Cor.* coronoid process.

Plate 4.

Skull of *Zarhachis flagellator* Cope. About ⅖ natural size. Lateral view, showing external pterygoid and surrounding bones. Abbreviations: *Ch.*, channel or shelf formed between external pterygoid and frontal; *Ex. pt.*, external pterygoid; *Fo. inf.*, infraorbital foramen; *In. pt.*, internal pterygoid; *Max.*, maxilla; *Max. dep.*, maxillary depression; *Po. gl. p.*, postglenoid process of squamosal; *S. or. pr.*, supraorbital process of frontal; *V.*, vomer; *Zyg.*, zygomatic process of squamosal.

Plate 5.

Skull of *Platanista gangetica* Lebeck. About ⅔ natural size. Lateral view. The external and internal pterygoids have been removed to show position of the palatine. The right squamosal and its zygomatic process has also been removed. Abbreviations: *Bo.*, basioccipital; *Bs.*, basisphenoid; *C.*, condyle; *Ex. o.*, exoccipital; *Fo. inf.*, infraorbital foramen; *Fr.*, frontal; *In. pt.*, internal pterygoid; *Max.*, maxilla; *Max. cr.*, maxillary crest; *Pl.*, Palatine; *S. or. pr.*, supraorbital process of frontal; *V.*, vomer.

Plate 6.

Skull of *Platanista gangetica* Lebeck. About ⅔ natural size. Lateral view. showing external pterygoids and surrounding bones. The right maxillary crest has been removed. Abbreviations: *Bo.*, basioccipital; *Bs.*, basisphenoid; *C.*, condyle, *Ex. o.* exoccipital; *Ex. pt.*, external pterygoid; *Fo. inf.*, infraorbital foramen; *Fo. ov.*, foramen ovale; *Fr.*, frontal; *In. pt.*, internal pterygoid; *Lac.*, socket for insertion of lachrymal; *Max.*, maxilla; *Max. cr.*, maxillary crest; *Po. gl. p.*, postglenoid process of squamosal; *S. or. pr.*, supraorbital process of frontal; *Sq.*, squamosal; *V.*, vomer; *Zyg.*. zygomatic process of squamosal.

Plate 7.

Fig. 1, Left tympanic of *Platanista gangetica* Lebeck, Superior view; 2, Left tympanic of *Zarhachis flagellator* Cope, Superior view; 3, Right tympanic of *Platanista gangetica* Lebeck, Internal view; 4, Right tympanic of *Zarhachis flagellator* Cope, Internal view; 5, Left periotic of *Platanista gangetica* Lebeck, Inferior view; 6, Left periotic of *Zarhachis flagellator* Cope, Inferior view, posterior process missing; 7, Left periotic of *Plantanista gangetica* Lebeck, Internal view; 8, Left periotic of *Zarhachis flagellator* Cope, Internal view, posterior process missing. All figures about ⅔ natural size.

PLATE 8.

Fig. 1. Right tympanic of *Platanista gangetica* Lebeck, External view; 2, Right tympanic of *Zarhachis flagellator* Cope, External view; 3, Left tympanic of *Platanista gangetica* Lebeck, Inferior view; 4, Left tympanic of *Zarhachis flagellator* Cope, Inferior view; 5, Atlas of *Zarhachis flagellator* Cope, Dorsal view. Figs. 1–4, about 7/10 natural size; Fig. 5, about ½ natural size.

PLATE 9.

Fig. 1, Basihyal, ceratohyals, and thyrohyals of *Zarhachis flagellator* Cope Dorsal view; 2, Right stylohyal of *Zarhachis flagellator* Cope, Dorsal view; 3, Left stylohyal of *Zarhachis flagellator* Cope, Dorsal view. All figures about ⅓ natural size. 4, Paddle bones of *Zarhachis flagellator* Cope. The bones have been arranged in a graded series, but do not represent necessarily their true positions. About 4/11 natural size.

PLATE 10.

Vertebral column and ribs of *Zarhachis flagellator* Cope. Viewed as found in the matrix. 1, Atlas; 2, First dorsal; 3, Second dorsal; 4, Third dorsal; 5, Fourth dorsal; 6, Fifth dorsal; 7, Sixth dorsal; 8, Seventh dorsal; 9, Eighth dorsal; 10, Ninth dorsal; 11, Tenth dorsal; 12, First lumbar; 13, Second lumbar; 14, Third lumbar, centrum missing; 15, Fourth lumbar; 16, Posterior caudal; 17, Posterior caudal; 18, Posterior caudal; 19, First rib, right side; 20, Fourth rib, right side; 21, Third rib, left side; 22, Fourth rib, left side; 23, Fifth rib, left side; 24, Eighth rib, left side; 25, Ninth rib, left side; 26, seventh rib, right side. All elements about ⅛ natural size.

PLATE 11.

Fig. 1, Presternum of *Zarhachis flagellator* Cope, Superior view; 2, Mesosternum of *Zarhachis flagellator* Cope, Superior view. Both figures about ½ natural size.

PLATE 12.

Fig. 3, Posterior view of atlas of *Zarhachis flagellator* Cope; 4, Anterior view. Both figures about ⅔ natural size.

PLATE 13.

Dorsal vertebrae of *Zarhachis flagellator* Cope. About ⅔ natural size. Fig. 1, Eighth dorsal vertebra, Anterior view; 2, Fourth dorsal vertebra, Anterior view, showing missing epiphysis. 3, Fourth dorsal vertebra, Lateral view; 4, Eighth dorsal vertebra, Lateral view.

PLATE 14.

Dorsal vertebra of *Zarhachis flagellator* Cope. About ⅔ natural size. Fig. 1, Fourth dorsal vertebra, Posterior view; 2, Eighth dorsal vertebra, Posterior view.

PLATE 15.

Ribs of *Zarhachis flagellator* Cope, Left side. About ⅛ natural size. Fig. 1, Sixth rib; 2, Seventh rib; 3, Eighth rib; 4, Ninth rib; 5, Tenth rib; 6, Fourth lumbar vertebra (about ⅛ natural size).

PLATE 16.

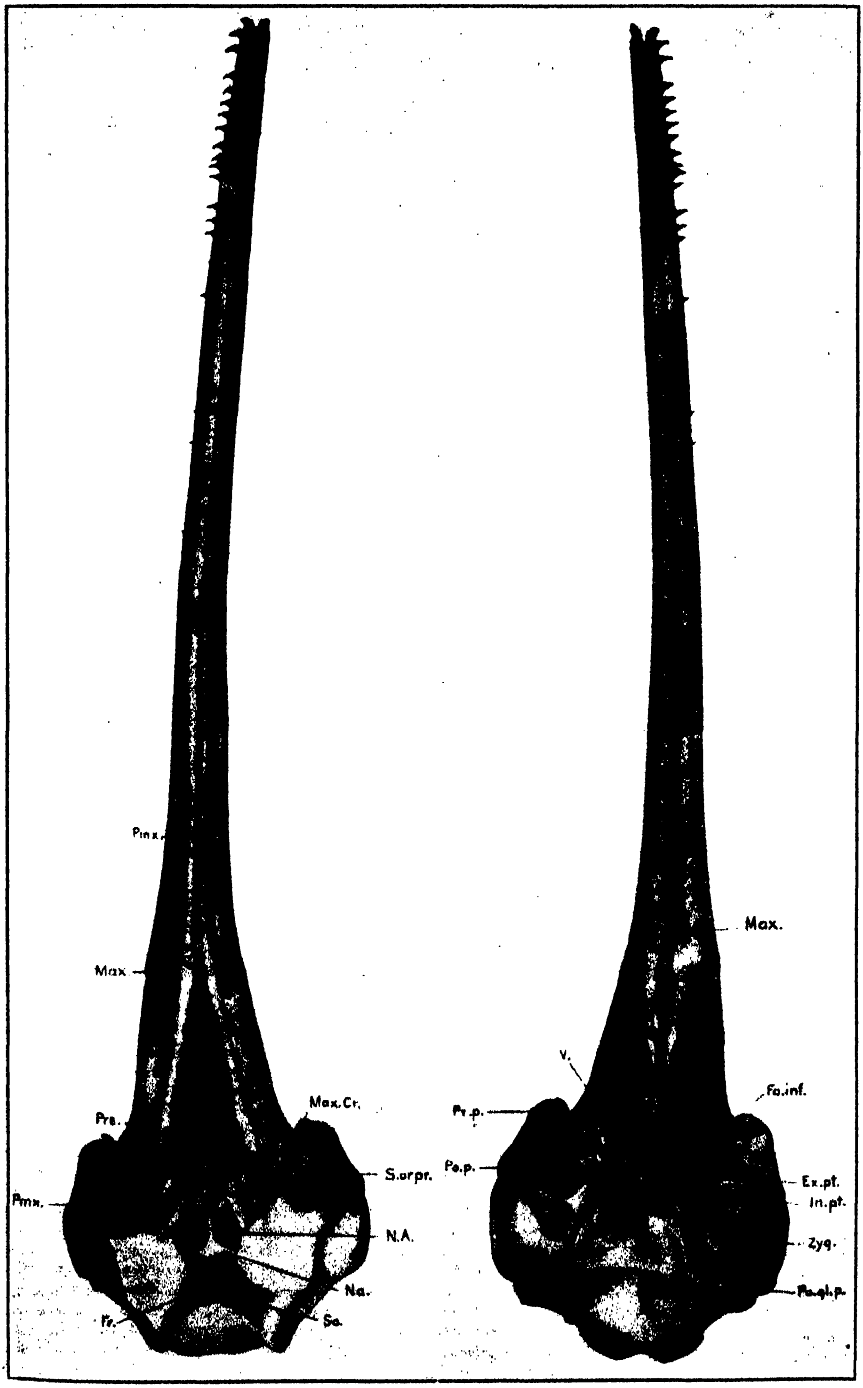
Ribs of *Zarhachis flagellator* Cope, Right side. About ⅓ natural size. Fig. 1, First rib; 2, Second rib; 3, Fourth rib; 4, Fifth rib; 5, Sixth rib; 6, Ninth rib; 7, Tenth rib.

PLATE 17.

Posterior caudal vertebrae of *Zarhachis flagellator* Cope. About ⅗ natural size. Figs. 1–3, Inferior views of caudals; 4–6, Superior views of caudals.

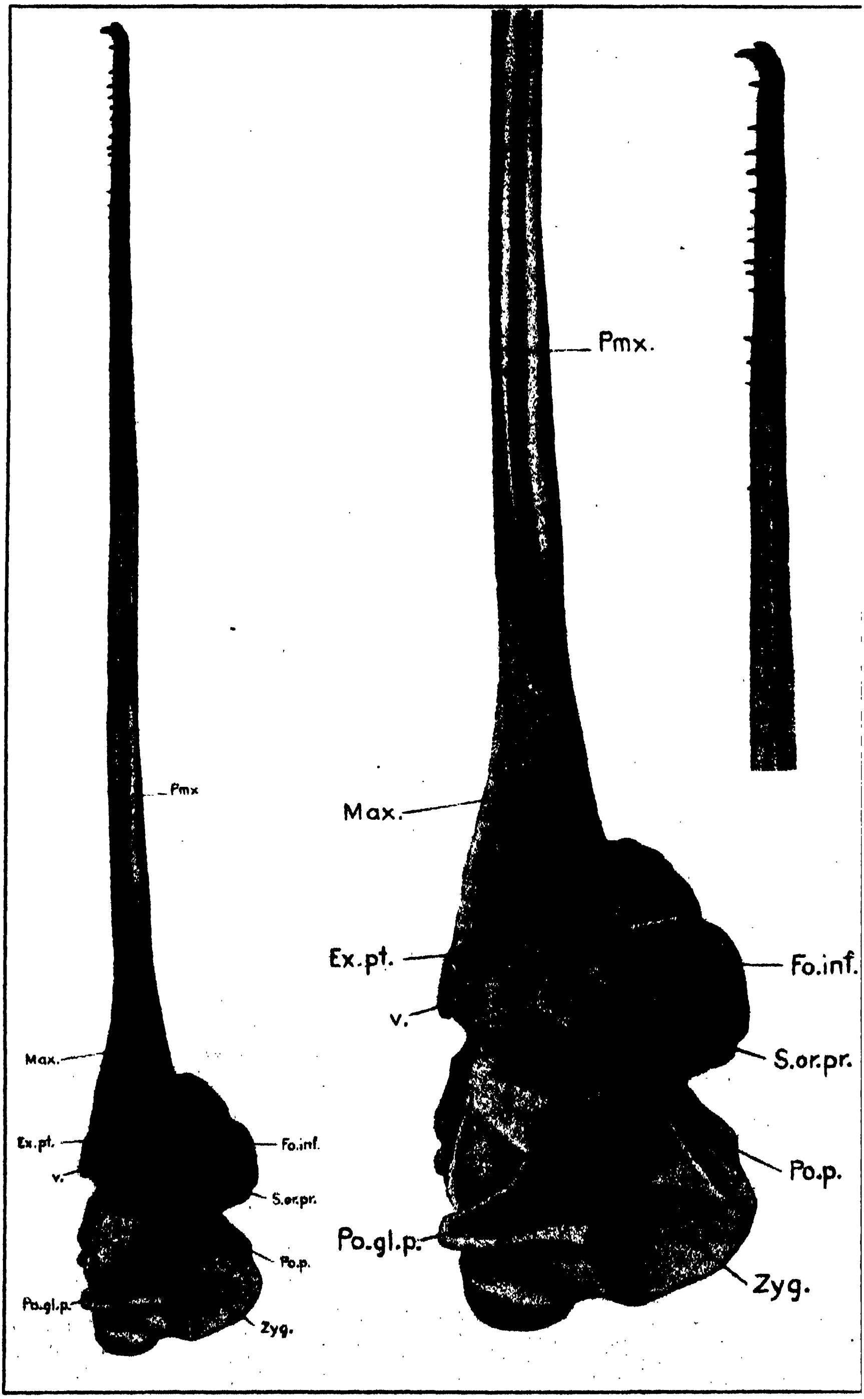
PLATE 18.

Figs. 1–4, Chevrons of *Zarhachis flagellator* Cope, Lateral view; 5–7, Caudal vertebrae of *Zarhachis flagellator* Cope, Anterior views. All figures about ⅔ natural size.



DORSAL AND VENTRAL VIEWS OF SKULL OF ZARHACHIS FLAGELLATOR.

FOR EXPLANATION OF PLATE SEE PAGE 38.



LATERAL VIEW OF SKULL OF ZARHACHIS FLAGELLATOR.

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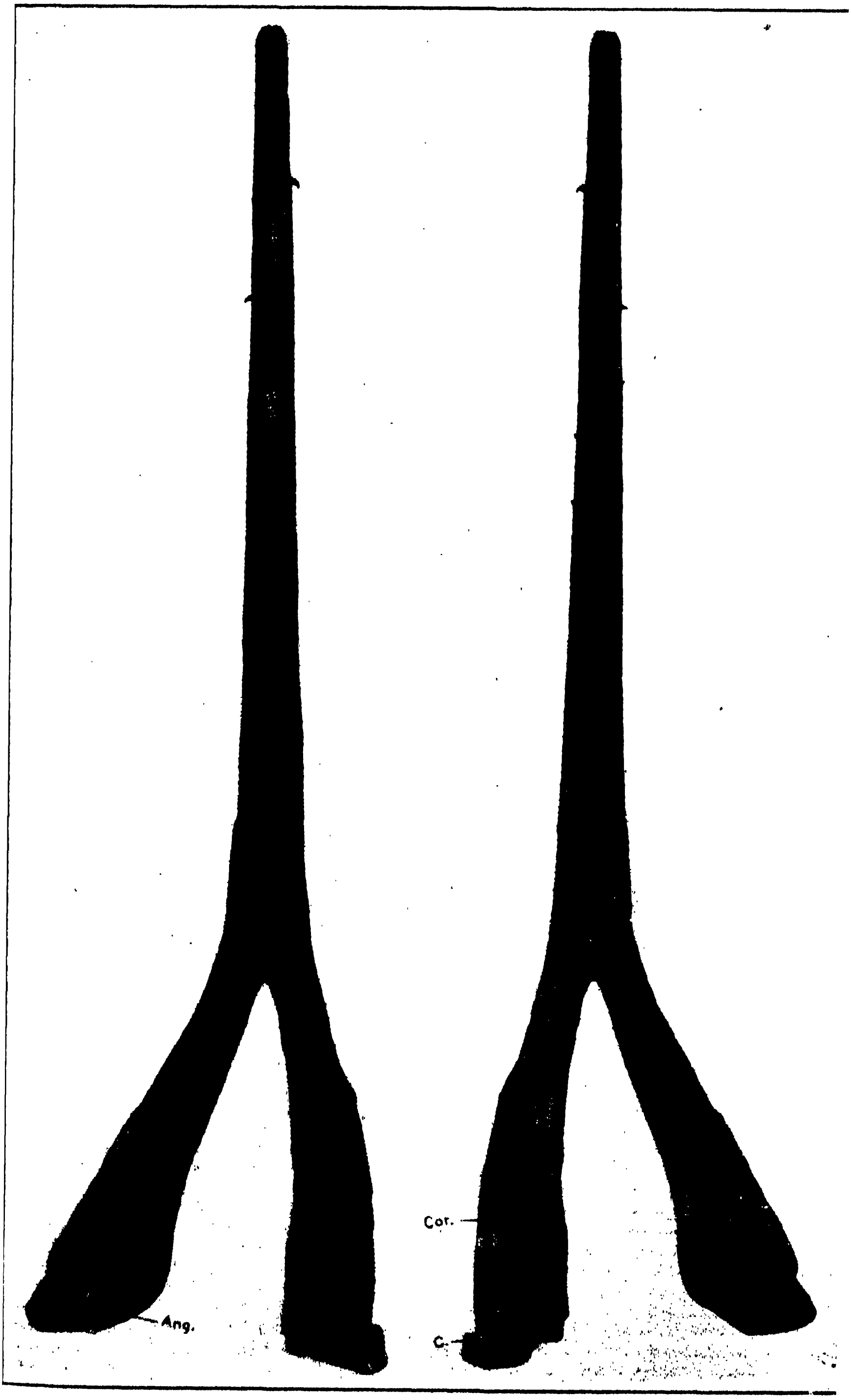
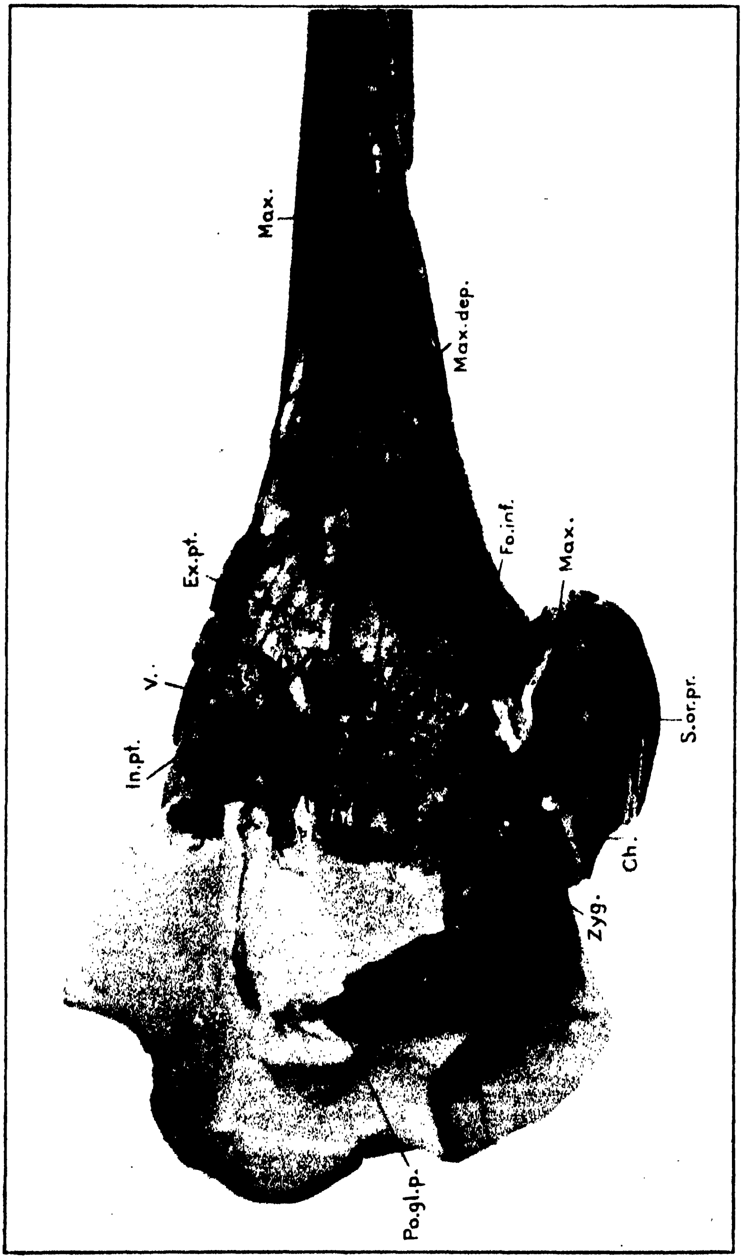


DORSAL AND VENTRAL VIEWS OF MANDIBLES OF ZARHACHIS FLAGELLATOR.



LATERAL VIEW OF SKULL OF ZARHACHIS FLAGELLATOR.

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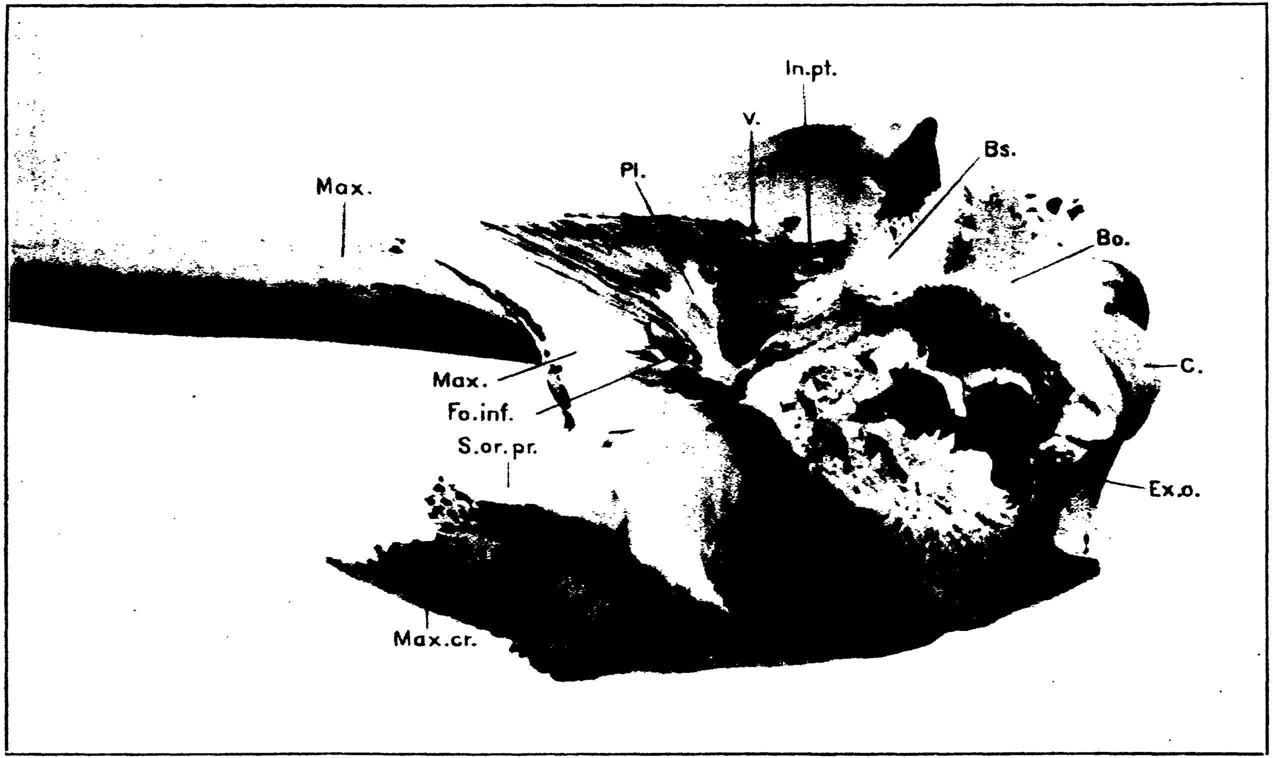

LATERAL VIEW OF SKULL OF PLATANISTA GANGETICA.

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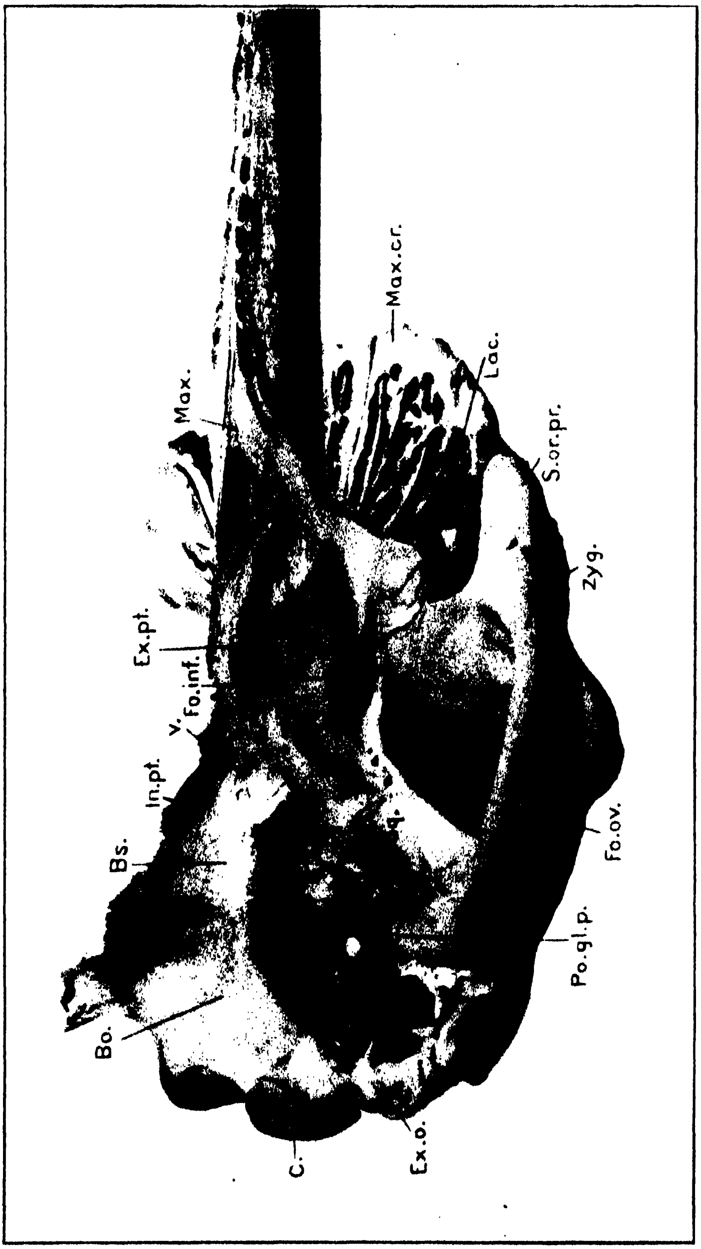

LATERAL VIEW OF SKULL OF PLATANISTA GANGETICA.

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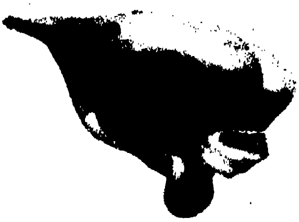

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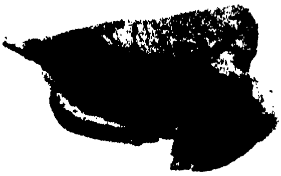

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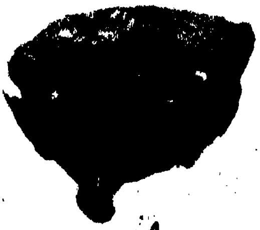

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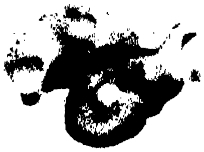

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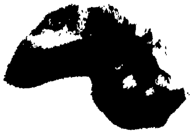

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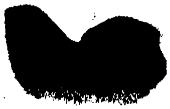

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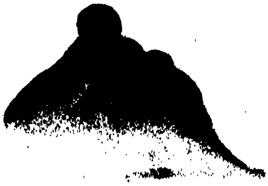
VIEWS OF TYMPANIC AND PERIOTIC BONES.

FOR EXPLANATION OF PLATE SEE PAGE 37.



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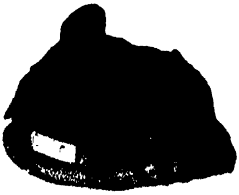

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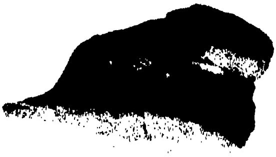

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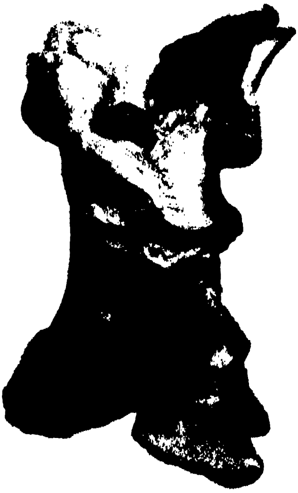

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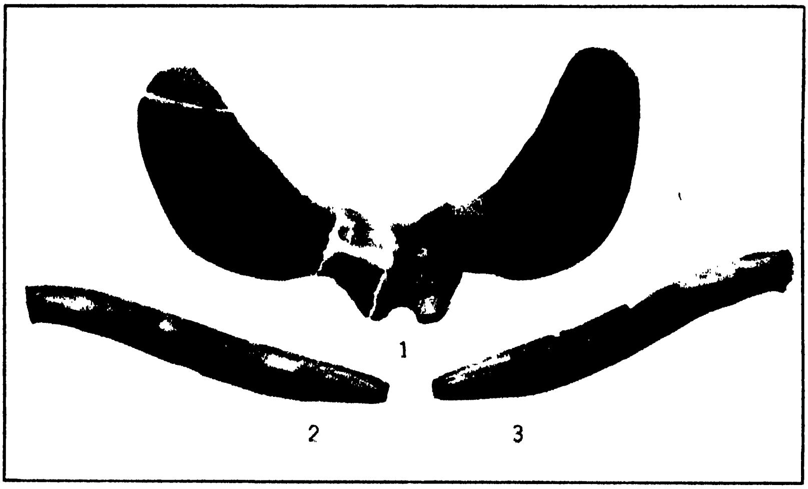
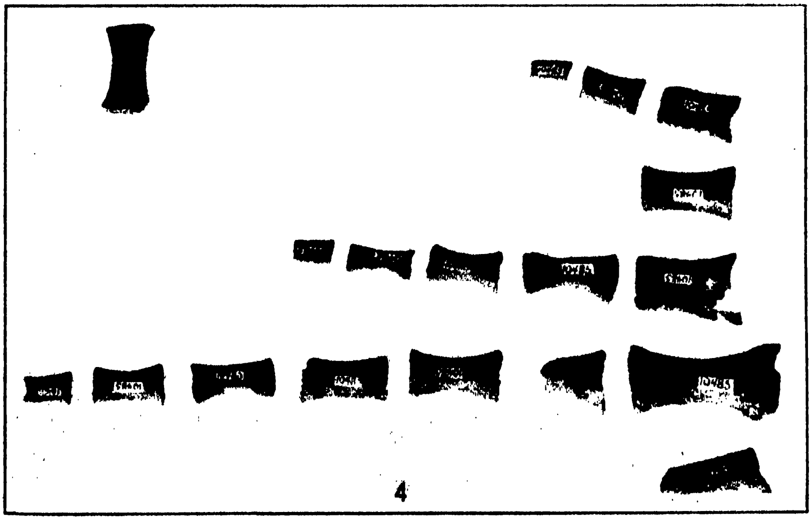
VIEWS OF TYMPANIC BONES (1-4) AND DORSAL VIEW OF ATLAS (5).

FOR EXPLANATION OF PLATE SEE PAGE 38.



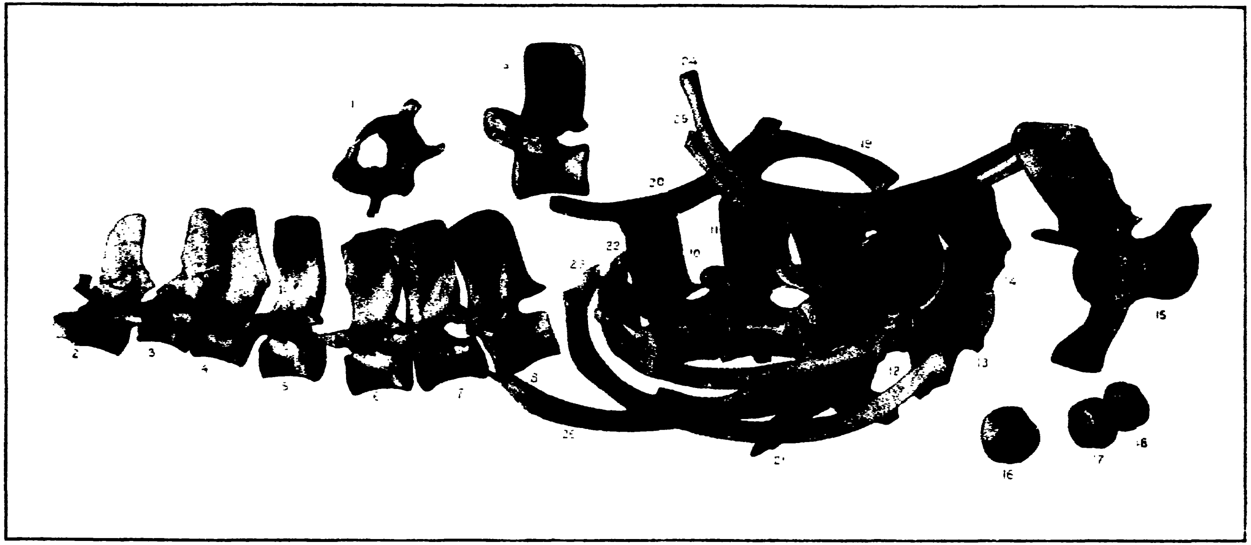
HYOID BONES OF ZARHACHIS FLAGELLATOR.

FOR EXPLANATION OF PLATE SEE PAGE 38.



BONES IN THE MANUS OF ZARHACHIS FLAGELLATOR.

FOR EXPLANATION OF PLATE SEE PAGE 38.



VERTEBRAL COLUMN AND RIBS OF ZARHACHIS FLAGELLATOR.

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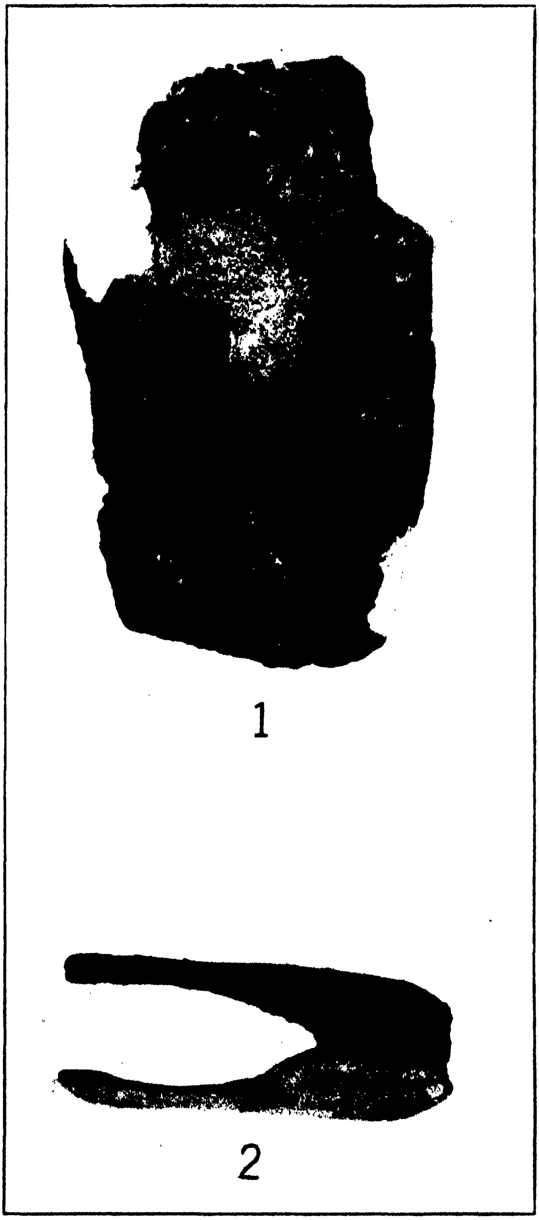
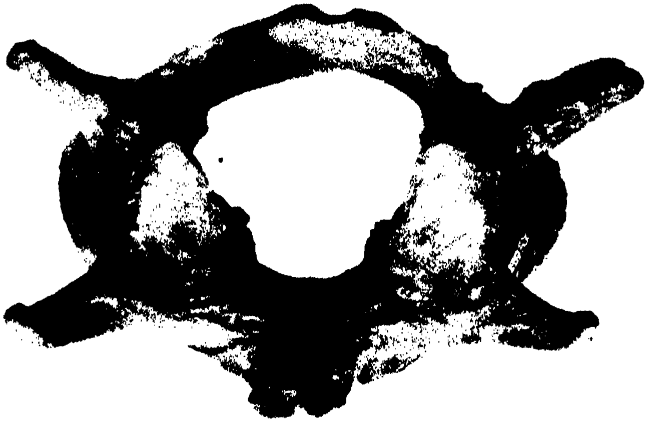


Sternum of Zarhachis flagellator.

For explanation of plate see page 38.



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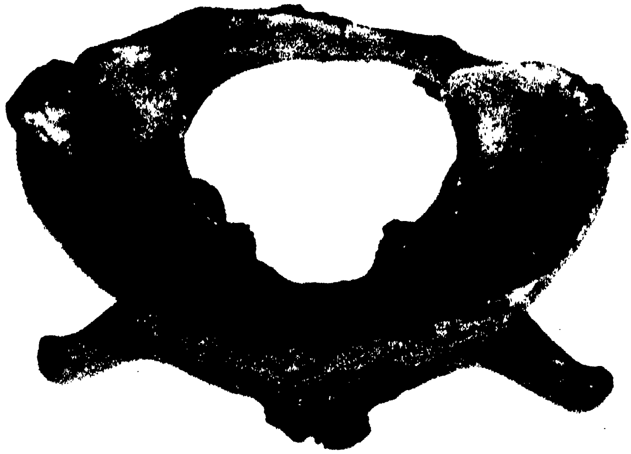

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VIEWS OF ATLAS OF ZARHACHIS FLAGELLATOR.

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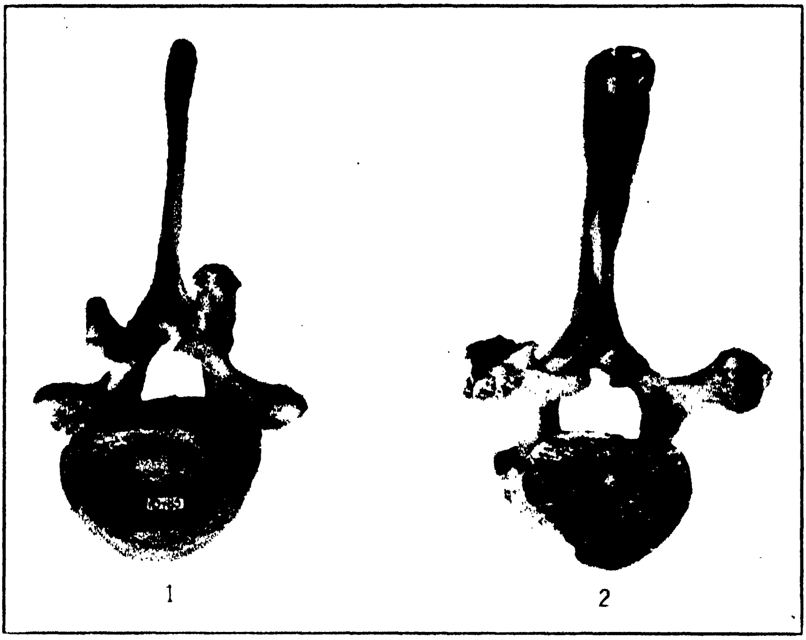

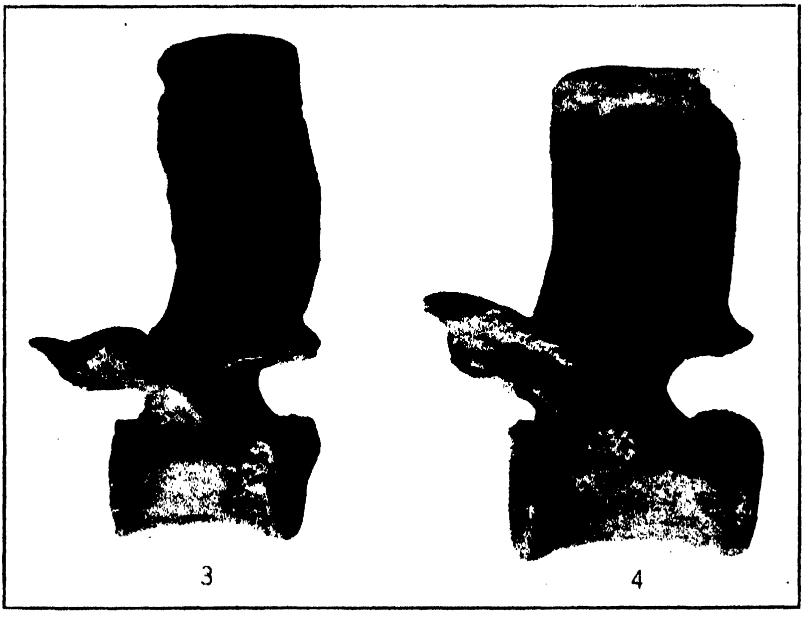

VIEWS OF DORSAL VERTEBRAE OF ZARHACHIS FLAGELLATOR.

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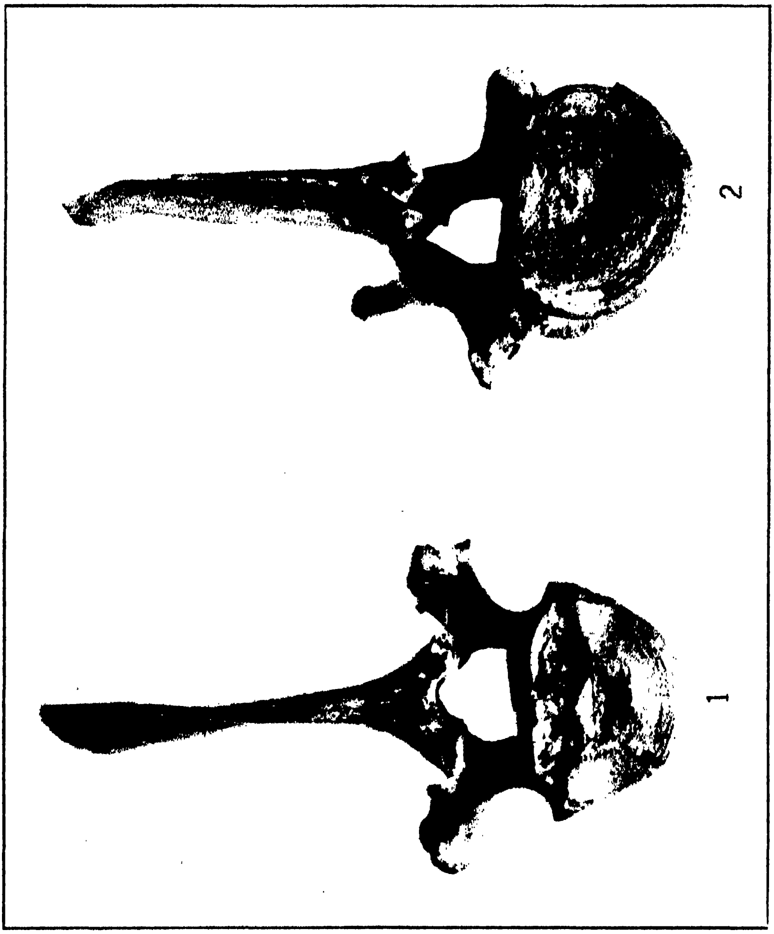

POSTERIOR VIEWS OF DORSAL VERTEBRAE OF ZARHACHIS FLAGELLATOR.

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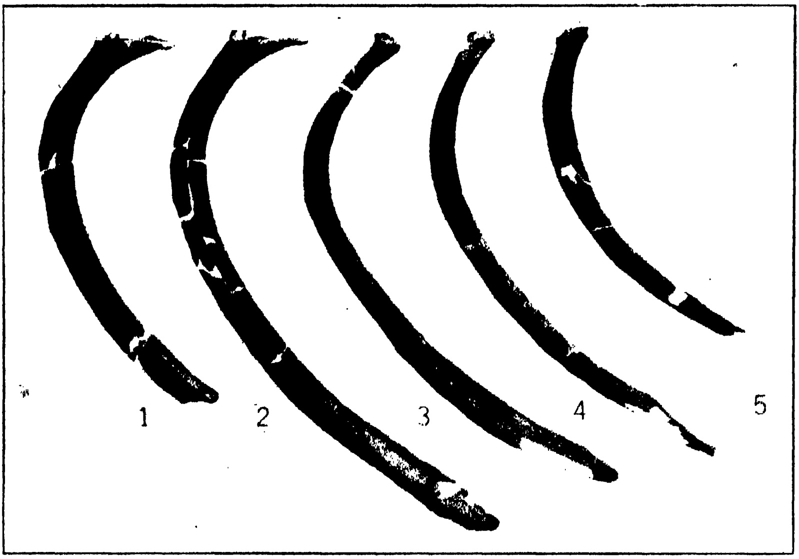
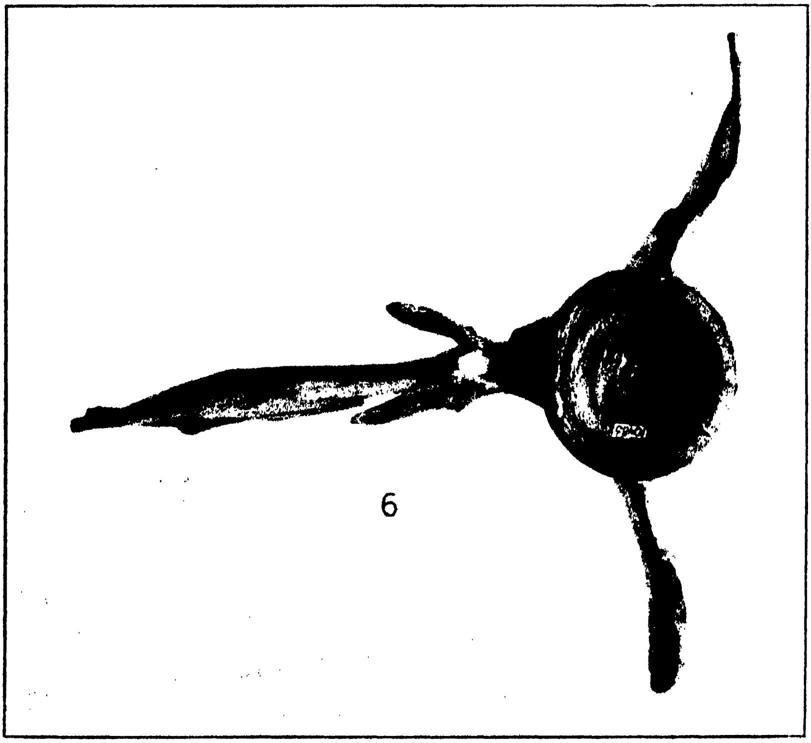


VIEWS OF RIBS OF ZARHACHIS FLAGELLATOR.



ANTERIOR VIEW OF FOURTH LUMBAR VERTEBRA OF ZARHACHIS FLAGELLATOR.

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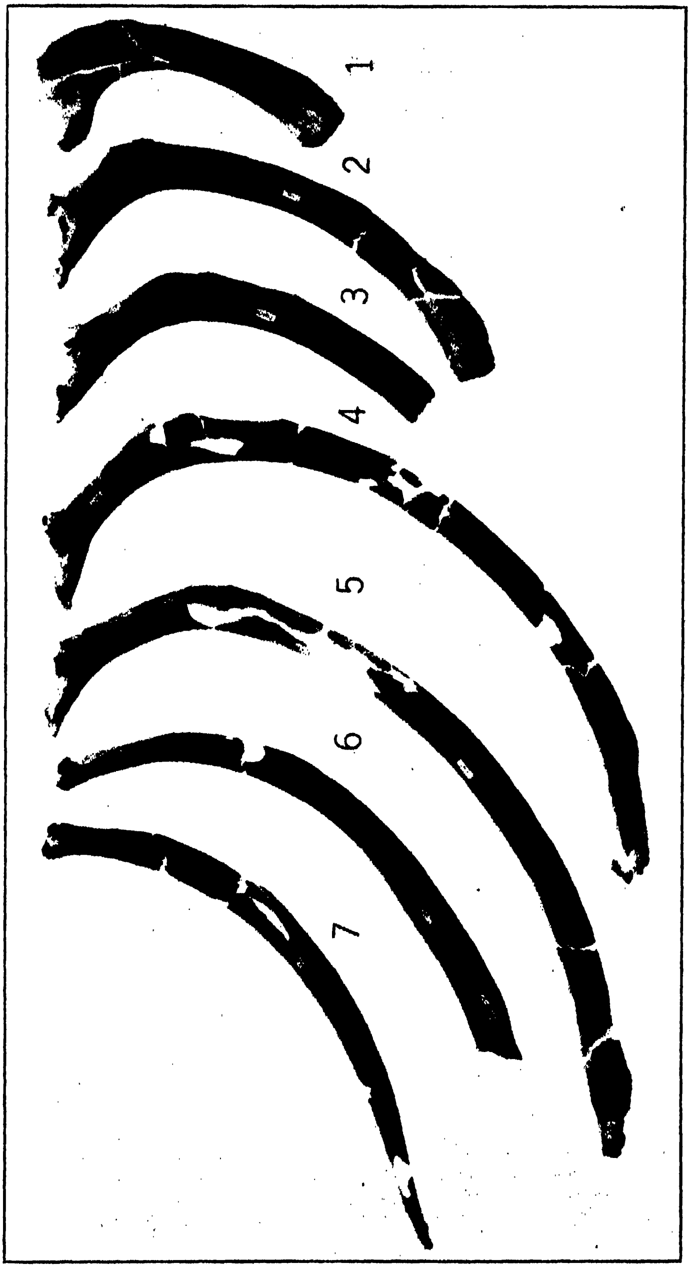
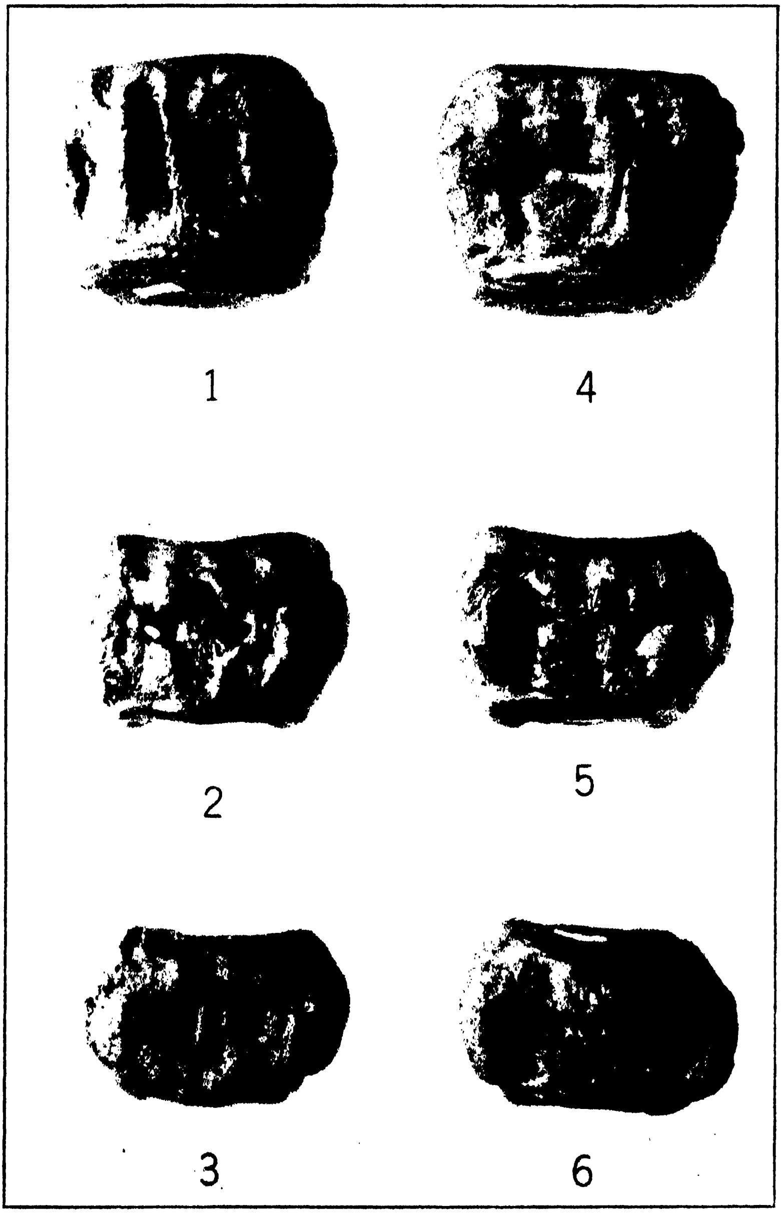


VIEWS OF RIBS OF ZARHACHIS FLAGELLATOR.

FOR EXPLANATION OF PLATE SEE PAGE 39.



VIEWS OF POSTERIOR CAUDAL VERTEBRAE OF ZARHACHIS FLAGELLATOR.

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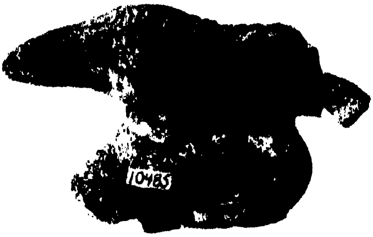

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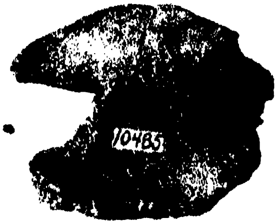

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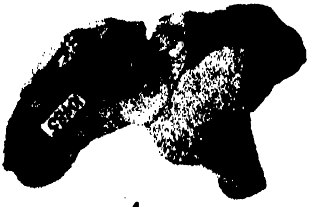

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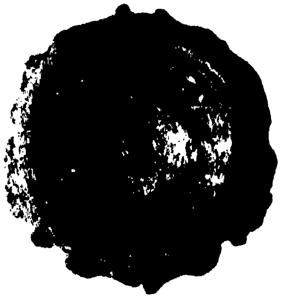

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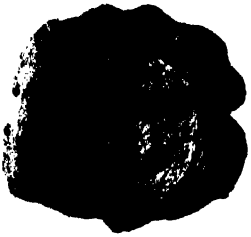

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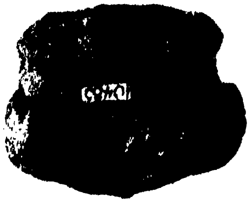

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CHEVRON BONES AND POSTERIOR CAUDAL VERTEBRAE.

FOR EXPLANATION OF PLATE SEE PAGE 39.

DESCRIPTION OF A NEW GENUS AND SPECIES OF WHALEBONE WHALE FROM THE CALVERT CLIFFS, MARYLAND.

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In the course of studying the collection of fossil cetaceans in the United States National Museum, a cranium of an apparently undescribed whale was found. A cursory examination revealed so many features of unusual interest that it led to further comparisons and a review of previously described forms. This cranium lacks the rostrum, as well as the jugals, the lachrymals, the palatines, and the nasals. What remains, however, is fairly well preserved and clearly pertains to a small mystacocetacean of a primitive type, related to the Miocene cetotheres, but differing in certain important details from the previously known crania referred to this group.

The cranium belonged to a small cetacean, probably some 15 or 20 feet long. Obvious peculiarities are its relatively narrow and compressed braincase, wide basicranium, parietals forming part of the vertex, relatively small and flattened occipital condyles, and subhemispherical protuberances on the lateral margins of the basioccipital. These characters, together with features exhibited by the periotic and tympanic, are sufficient to indicate its relationship to the Mystacoceti. Though possessing many features in common with *Idiocetus* and *Cetotherium*, this cranium shows so many points of difference that it seems worthy of rank as a distinct genus.

PARIETOBALAENA, new genus.

Diagnosis.—A new and interesting cetothere with large parietals which meet mesially and form a short sagittal crest between the apex of the supraoccipital and the frontals; maxillary, premaxillary, and nasal sutures barely extending backward beyond level of anterior margin of supraorbital plate of frontal at constriction; orbit large; temporal fossae wide; zygomatic process of squamosal relatively small and slender, but apparently not extending forward to extrem-

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ity of post orbital projection of supraorbital plate; condyles small and borne on short necks; exoccipitals directed obliquely downward and backward, with their lateral margins projecting beyond level of articular faces of condyles; jugular incisure deep and rather broad; angle formed by anterior margin of squamosal and its zygomatic process external in position.

The periotic exhibits a marked modification of the type present in skulls of *Rhachianectes glaucus*, *Megaptera nodosa*, and *Cetotherium rathkei*. The labyrinthic region is strongly compressed, so much so that the cerebral aperture of the facial canal, the internal acoustic meatus, and the aperture of the *aquaeductus cochleae* open on the dorsal face of this bone and not on the internal face as in living whalebone whales. The tympanic and periotic exhibit only minor modifications of the type found in *Idiocetus laxatus*.

PARIETOBALAENA PALMERI, new species.

Type.—Cat. No. 10668, Division of Vertebrate Palaeontology, United States National Museum. This specimen consists of a cranium in a fair state of preservation; the nasals, jugals, and lachrymals, as well as the rostrum and its component parts, the maxillæ, premaxillæ, and vomer are missing. Both periotics are preserved in place. One imperfect tympanic also belongs with this skull.

Type locality.—The occurrence is as follows: Near latitude 38° 35′ N., longitude 76° 31′ E., on the western shore of Chesapeake Bay, 1 mile above Dares Wharf, Calvert County, Maryland. Shown on Patuxent Quadrangle or Patuxent Folio No. 152, United States Geological Survey.

Horizon.—The specimen was discovered and excavated by William Palmer on August 14, 1913. It was dug from the cliff 3 feet above the beach and about 8 feet above the wide shell stratum (Shattuck's zone 10), which is at this point well under the beach level; thus, it was found at about the center of zone 11, both strata being here much thicker than further northward. It may thus be assigned to Shattuck's zone 11 of the Calvert Miocene formation of Maryland.

DESCRIPTION OF THE SKULL.

Dorsal view.—In general form the skull of *Parietobalaena* is directly intermediate between *Cetotherium* and *Idiocetus*. The most obvious features of this skull (pl. 1) are: The marked intertemporal constriction of the cranium and the triangular shape of the supraoccipital, which is broad at the base and whose sides curve obliquely upward, forming an apex on the vertex. The form and dimensions of the bones comprising the rostrum are unknown. The frontals and squamosals project strongly from the sides of the brain case. As a result of these features, together with the exclusion of the frontals from the vertex of the skull and the position of the nasal, maxillary, and premaxillary sutures, it bears a general resemblance to the skull of *Idiocetus laxatus*,[1] and is thus somewhat different from that *Agorophius pygmaeus*. A more detailed comparison shows that the skull of *Agorophius* is considerably smaller, possesses projecting condyles and relatively shorter supraorbital processes of the frontals and lacks a sagittal crest; the nasal, premaxillary, and maxillary sutures lie posterior to the anterior margins of supraorbital processes, while the apex of the supraoccipital is rounded and not pointed on the vertex of the skull. An additional modification is shown in the great transverse breadth and proportionately short length of the temporal fossae of *Parietobalaena*.

The frontals in the skull of *Parietobalaena* are excluded from the vertex of the skull by the parietals, which meet mesially in the intertemporal region to form a short sagittal crest. The rostral wall of the cranium is formed largely by the frontals. They are relatively short antero-posteriorly and are suturally united along the median line. Either frontal, with its lateral extension—the supraorbital plate—is constricted mesially; the preorbital projection is rounded, while the postorbital is slender and produced backward. The supraorbital plate of each frontal has a strong sagittal arch, anterior to which the surface slopes forward in a moderate curve, while posteriorly it turns sharply downward. Compared with *Cetotherium rathkei*,[2] the supraorbital plates are narrower, shorter, and consequently less curved.

The parietals, which meet along the dorsal margin of the cranium behind the orbits to form a short sagittal crest, are suturally united with the triangular supraoccipital posteriorly and with the frontals anteriorly. Anteriorly the parietal sends forward a thin sheet of bone which, on the left side of the cranium, partially conceals the fronto-parietal suture. The imperfect preservation of this surface on the right side exposes the suture for its entire extent. From this it will be seen that it is similar in position to the same suture in the skull of *Agorophius pygmaeus*.[3]

The frontals, as remarked above, are overridden by the parietals posteriorly, and the maxillæ, premaxillæ, and nasals anteriorly. On either side of the median line there is a narrow grooved sinus, with its inner margin elevated above and its outer margin depressed below the frontal surface, for the reception of a nasal. The shape of this area suggests that the nasals must have been very narrow, closely approximated, and slightly widening anteriorly. The sinuses on the superior face of the frontal for the reception of the nasals, as discussed above, occupy a sloping surface 34 mm. long, 17 mm. wide proximally, and 23 mm. wide distally. The sutures are shallow posteriorly and become deeper anteriorly. At either side of the nasal sinuses appears a similar depression for the ascending process of the premaxilla, whose maximum width is about equal to that of the base of the nasal. External to these sinuses for the premaxillæ there are eight or more grooves for lodging the posterior ends of the maxillæ. Each of these grooved areas is approximately 33 mm. wide and beyond these the surface of the frontal is relatively smooth.

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[1] Van Beneden, P. J., Description des ossements fossiles des environs d'Anvers. Part 5. Annales du Musée Royal d'historie Naturelle de Belgique, Bruxelles, vol. 13, pl. 54, fig. 1, 1886.

[2] Brandt, J. F., Untersuchungen ueber die fossilen und subfossilen Cetacean Europa's, Mem. Acad. Imp. Sci. de St. Petersbourg, ser. 7, vol. 20, No. 1, pl. 1, figs. 1–2, 1878.

[3] True, F. W., Remarks on the type of the fossil cetacean *Agorophius pygmaeus* (Müller). Special Publ. 1694, Smithsonian Institution, pl. 6, fig. 8, 1907.

The supraoccipital is very broad at the base and its sides curve obliquely upward; in consequence the apical portion is pointed and not rounded as in *Agorophius pygmæus*. There is a well defined carina on the apical portion of this bone, on either side of which the surface is slightly depressed. These depressed areas on the apical half of the supraoccipital probably afforded an extensive area for the attachment of the muscles which assist in raising the snout. The condyles do not project beyond the plane of the exoccipitals. The squamosals and their slender zygomatic projections form the posterior and outer margins of the temporal fossæ. Both zygomatic processes are incomplete anteriorly, but it is doubtful whether they were originally in contact with the postorbital projection of the supraorbital plate of the frontal.

Posterior view.—As a whole this view narrows toward the vertex from the postglenoid processes of the squamosals. As seen from this aspect the supraoccipital curves upward and forward. The lambdoidal crest, formed by the lateral margins of this bone and the abutting edges of the parietals and squamosals, is well marked and becomes more prominent toward the apex. The supraoccipital is broadly sutured to the parietal as is shown by the exposed edge of the parietal (pl. 2) which at this point is 26 mm. wide.

The exoccipitals are relatively small, coalesced with the supraoccipital above, and projecting outward and backward. Anteriorly they are suturally united with the squamosals while inferiorly they are fused with the basioccipital. A somewhat similar arrangement of the bones comprising the basicranium is shown by *Cetotherium megalophysum*, but in this form the exoccipitals do not extend backward beyond the condyles, although they are produced downward below them.

The opening for the foramen magnum is almost circular. The occipital condyles are semielliptical in outline, considerably broader near the base than near the apex, and slightly convex from side to side. They are borne on very short condylar processes and are set off from the exoccipitals by shallow concavities. The peculiarities of the occipital condyles correspond more closely with those of *Cetotherium megalophysum* than with any other cetothere described by Cope. In *Agorophius* and *Archaeodelphis*[4] the condyles are much more protuberant and are set off from the exoccipitals by distinct necks. The articulating surfaces of the condyles are relatively larger; their flattened appearance and short neck indicate that the skull rests firmly upon the corresponding articular surfaces of the atlas. This modification, in turn, leads one to conclude that the anterior cervicals, at least, were fused together. The small mastoid region for muscle attachments, taken in connection with a broad, flattened, and shallow condylar surface, indicates a limited degree of mobility for the head. In all probability its habits in feeding and the correlated movements of the head were similar to those of living whalebone whales.

Lateral view.—The marked convexity of the cranium, the arched base line, together with flattened occipital condyles, closely appressed exoccipitals, and the marked ventral projection of the postglenoid processes, combine to lend this aspect of the skull (pl. 3) a very different appearance from that of *Agorophius pygmaeus*. In this specimen the highest point of the dorsal profile is formed by the apex of the supraoccipital, in front of which the sagittal crest formed by the parietals slopes forward to the rostrum. In *Agorophius*, on the contrary, there is an obvious elevation of the skull at the base of the maxillaries, back of which the dorsal profile is seen to extend on a nearly horizontal plane to the apex of the supraoccipital.

The zygomatic process of the squamosal is slender, tapering anteriorly; the dorsal surface slopes gradually forward. This is in strong contrast to *Cetotherium rathkei*, in which it is large and thickened and underlaps the postorbital projection of the supraorbital plate. Correlated with this difference is the form of the glenoid cavity and the length of the postglenoid process. In form this portion of the squamosal apparently bears a closer resemblance to *Cetotherium* than to *Agorophius*, *Archaeodelphis*, or *Patriocetus*[5]. The postglenoid process is a thick plate of bone projected more backward than downward and whose posterior face is grooved by the external auditory meatus. This process is rather broad and terminates in a blunt, rounded tip. The squamosal as a whole is relatively large, firmly fixed to the side of the skull, and internally takes part in the formation of the lateral wall for the cranium.

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[4] Allen, G. M., A new fossil cetacean. Bull. Mus. Comp. Zool. at Harvard College, vol. 65, No. 1, pl., figs. 1–2, 1921.

[5] Abel, O., Die Vorfahren der Bartenwale. Denkschr. d. Kais. Akad. Wissensch. math.-naturw. Kl., Wien, vol. 90, pls. 2, 6, 12, 1913.

In the temporal fossa the external pterygoid lies below the alisphenoid and is in contact with the squamosal. In either temporal fossa the parietal is suturally united with the squamosal posteriorly, with the small alisphenoid inferiorly, and with the frontals anteriorly. The parietals, which instead of being excluded from the vertex of the skull as in some of the living whalebone whales, meet behind the frontals and form the narrow isthmus connecting the occipital portion of the skull with the pretemporal. As a whole the exposed surface of the parietal widens toward the vertex from the sphenoidal fissure.

In most cetaceans at least two foramina are visible in each temporal fossa. *Parietobalaena*, apparently, does not possess all of these foramina and may possibly have retained a more primitive method of affording exit to the cranial nerves. Slightly in advance of the zygomatic process is the foramen ovale whose aperture is seen at the anterior bifurcation of the squamosal. Above and in front of this foramen is the very large sphenoidal fissure, an excavation in the wall of the cranium. Through this fissure the optic and the second division of the fifth nerves probably emerged. The ala temporalis or alisphenoid is preserved on either side, and its extremity appears in the wall of the temporal fossa above the external pterygoid.

A complete osseous roof for the orbit is afforded by the supraorbital plate of the frontal. The postorbital projection of this plate is longer than the preorbital and, originally, may possibly have been in contact with the zygomatic process of the squamosal. This, however, is doubtful for the postorbital projection of the frontal bears no articular surface which would suggest such a contact. The supraorbital plate is convex above and concave below. It is thus evident that the supraorbital plate of the frontal has a more arched form, and in particular is relatively longer transversely than in *Patriocetus.*

The exoccipitals are flattened up against the squamosals and from a side view are concealed by the squamosals.

Ventral view.—The basioccipital is a relatively narrow bone with ventral surface concave from side to side. On each side and near the condyles is a prominent subhemispherical protuberance whose posterior face slopes obliquely forward and is conspicuously concave. On account of these knoblike lateral processes the basioccipital bears a close resemblance to the same element in the basicranium of *Cetotherium.*

Anterior to the lateral protuberance on the left side is the posterior end of the imperfectly preserved internal pterygoid. The basicranium was broken during removal from the cliff and some of the bones and sutures were thus damaged or destroyed. The suture between the basioccipital and the basisphenoid does not show on plate 4, but close scrutiny of the exposed surfaces shows that this transverse suture lies between the base of the V-shaped fracture and the anterior margins of the subhemispherical protuberances. The occipital condyles do not project backward as far as the plane of the exoccipitals. A groove, which originates within the cranial cavity, follows down the external face of the basioccipital, makes a broad, deep channel on the basioccipital and exoccipital, and terminates on the posterior margin of the last mentioned bone. This is interpreted to represent the posterior lacerated foramen.

The basisphenoid is a flat bone and may have been largely concealed by the vomer. No pieces of the vomer were preserved with this skull. The vaginal plates of the internal pterygoids are not preserved in their entirety, but the one on the right side overspreads a portion of the basisphenoid. It is suturally united above with the external pterygoid. The internal pterygoid as originally preserved was in contact with the supraorbital process of the frontal, touching the descending anterior wall of the optic canal near the base of that structure. An examination of the interior of the cranium shows that two processes arise from the anterior end of the basisphenoid, one of which, the ala temporalis, projects upward and outward and its extremity appears in the temporal fossa as a small element (quadrangular in outline) wedged in between the squamosal, parietal, and pterygoid; the other process, the external pterygoid,[6] appears in the internal wall of the temporal fossa, and apparently forms the floor for the scaphoid fossa. The roof of the scaphoid fossa is formed in part by the basisphenoid and the overspreading external pterygoid.

The internal pterygoid terminates posteriorly in front of the lateral protuberance of the basioccipital. The curvature of the descending portion of the internal pterygoid and the position of the suture which marks its contact with the external pterygoid supports the view that the hamular processes would be reduced or even absent.

The zygomatic process of the squamosal is slender in *Parietobalaena*, but not strongly arched, and hence the jaw articulation would be limited in extent. In skulls of the living species of *Balaenoptera*, especially *Balaenoptera borealis*, there is within the temporal fossa a deep crease in the anterior margin of the squamosal. This crease or angle is most conspicuous when viewed from the ventral side and is situated in front of or internal to the glenoid fossa. The absence of this crease or angle is one of the generic distinctions for *Megaptera*, for in this genus the anterior margin of the squamosal extends in an even curve from the zygomatic to the falciform process of that bone. The curvature of the anterior margin of the squamosal in the skull of *Parietobalaena* corresponds with that of *Cetotherium megalophysum* and *Metopocetus durinasus*, and thus differs from all living balaenopterine whales. In *Parietobalaena* the anterior margin of the squamosal, as seen from the ventral view, slopes obliquely outward and backward to a point on a line with the anterior margin of the periotic and then because of the zygomatic projection is directed rather abruptly forward. The angle is situated externally and not internally, as in *Balaenoptera*. The foramen ovale is situated in a V-shaped aperture formed between the diverging glenoid and falciform processes of the squamosal and their union with the external pterygoid.

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[6] In an article which appeared after this description was accepted for publication, Ridewood (Philos. Trans. Roy. Soc. London (B), vol. 211, pp. 260–266, 268, text figs. 14, 15. May, 1922) points out that Schulte (Mem. Amer. Mus. Nat. Hist., New York, new ser., vol. 1, pt. 6, pp. 476–477, pl. 54, fig. 2, pl. 55, fig. 2, March, 1916) has incorrectly interpreted the so-called external pterygoid bone and scaphoid fossa. Schulte distinguishes two pterygoid bones separated from each other by a suture. Ridewood maintains that Van Kampen (Morphol. Jahrb., Leipsig, vol. 34, Heft 3–4, p. 649, December, 1905) has correctly interpreted the parts under discussion. According to the latter, the pterygoid bone has pushed its way in between the alisphenoid and squamosal and thus forms part of the internal wall of the temporal fossa. In consequence, the pterygoid bone by itself bounds the pterygoid fossa [=scaphoid fossa of Schulte] anteriorly.

In ventral view the lateral projection of the squamosal forms the anteriorly projecting zygomatic process and the downward projecting postplenoid process; the antero-internal portion of the squamosal is bifurcated, forming the falciform and glenoid processes of that bone and thus contributing to the formation of the foramen ovale; the postero-internal portion is deeply indented and serves to lodge the periotic. The left zygomatic process as seen from the ventral view is slender and tapers anteriorly. The glenoid surface of the squamosal lies in approximately the same plane as the basioccipital; the anticular surface is rather wide and concave antero-posteriorly. A broad and deep channel for the external auditory meatus, which commences at the postero-internal margin of the squamosal, continues its course outward by winding around the postplenoid process of that bone. The apophysis of the periotic fills in the space between the exoccipital and the posterior margin of the groove on the squamosal for the external auditory meatus.

Ventrally, the frontals are produced outward, as mentioned previously, to form the expanded supraorbital plates. The right supraorbital plate is so incomplete that description will necessarily be limited to the opposite plate. It should be noted that the preorbital surface—that is, the surface in front of the obliquely directed crest which forms the anterior wall of the optic canal—presents no features which would prevent or indicate an overspreading of this surface by the horizontal ventral plates of the maxillæ.

MEASUREMENTS OF THE SKULL.

	mm.
Greatest breadth of skull across supraorbital processes (as preserved)	349
Greatest transverse diameter of left frontal (measured in a straight line from inner margin of frontal to tip of postorbital projection)	218.5
Least antero-posterior diameter of supraorbital process of frontal	66.5

	mm.
Greatest antero-posterior diameter of supraorbital process of frontal (tip of preorbital projection to tip of postorbital projection)	115
Distance from apex of supraoccipital to level of anterior margins of frontals	138. 5
Greatest breadth of skull across zygomatic processes of squamosal	332
Vertical height of skull (basisphenoid to apex of supraoccipital)	183
Least breadth of cranium between temporal fossae	99
Distance from vertex to upper margin of foramen magnum (estimated)	147
Height of foramen magnum (estimated)	37
Breadth of foramen magnum	40. 5
Greatest distance between outer margins of occipital condyles	86. 5
Greatest diameter of left condyle	65
Distance across skull between outer margins of exoccipitals	225. 5
Distance between tip of postglenoid and tip of zygomatic process of left squamosal	115
Distance between tip of left zygoma (as preserved) and postorbital projection of frontal	36. 5
Distance between tip of preorbital projection of supraorbital process of frontal and tip of postglenoid process of squamosal	242
Greatest breadth of basioccipital across lateral protuberances	75. 5
Distance between anterior margin of foramen magnum and anterior margin of basisphenoid	126

PERIOTIC.

The body of the right periotic (pl. 5, fig. 1) is irregularly quadrangular, although the internal margin is indented by a deep V-shaped depression. It differs greatly from the periotics of such whalebone whales as *Rhachianectes glaucus*, *Megaptera miocaena*,[7] and *Cetotherium rathkei*,[8] or from *Metopocetus durinasus*, and exhibits a close resemblance to that of *Idiocetus laxatus*.[9] The structural peculiarities of the periotic of *Idiocetus laxatus* are of the same general type as this fossil periotic. The differential features of the *Parietobalaena* periotic consists of a shorter and more robust posterior process and a larger internal acoustic meatus. The periotic of *Heterocetus brevifrons*[10] might be confused with this form, but in the latter the apex of the labyrinthic region is more pointed and the groove above external aperture of the *aquaeductus vestibuli* is much narrower. The labyrinthic region is strongly compressed, so much so that from a dorsal view (pl. 5, fig. 2) it appears to be crushed against the prootic. The margins of the labyrinthic region are well defined on the dorsal face. The dorsal surface of the prootic is closely applied to the petrous portion of the squamosal, and the anterior margin is in contact with the pterygoid process of the alisphenoid.

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[7] Kellogg, R., Proc. U. S. Nat. Mus., vol. 60, No. 2485, text figs. 1, 3, 6, 7, 1922.

[8] Brandt, J. F., Mem. Acad. Imp. Sci. de St.-Petersbourg, ser. 7, vol. 20, No. 1, pl. 3, fig. 2, 1873.

[9] Van Beneden, P. J., Description des ossements fossiles des environs d'Anvers. Part 5. Annales du Musée Royal d'histoire Naturelle de Belgique, Bruxelles, vol. 13, pl. 54, figs. 3–4, 1886.

[10] Van Beneden, P. J., Idem, vol. 13, pl. 26, figs. 2–5.

The posterior end, or apophysis, is elongate and expanded, and is produced externally as in most whalebone whales. The apophysis fills the cavity between the exoccipital and the posterior margin of the groove for the external auditory meatus. The posterior pedicle of the tympanic is fused to the apophysis. The pedicle on the anterior end of the tympanic is fused with the pro-otic and the point of contact (pl. 5, fig. 4) is situated in advance of the labyrinthic portion of the periotic. The anterior process, or pro-otic, is very large in proportion to the labyrinthic portion. The antero-external corner of the anterior process is rounded and the antero-internal is produced inward, forming a wedge-shaped plate or lamina. On the ventral face of the pro-otic (pl. 5, fig. 3) and opposite the fenestra ovalis is a circular depression in which the head of the malleus is lodged.

The internal wall of the opisthotic descends obliquely inward while the external wall of the labyrinthic portion of the periotic is more nearly vertical. Between these two closely approximated faces and at the top of the sinus which they form lies the semi-inclosed groove for the facial nerve. The groove which marks the course of the nerve is 10 mm. above the inferior face of the opisthotic and 8.5 mm. above the corresponding surface of the labyrinthic. The groove for the facial nerve begins at the posterior margin of the periotic and, curving inward, leads to the epitympanic orifice of the facial canal. The fenestra ovalis is situated on the ventral face of the labyrinthic portion of the periotic and on a level with the internal margin of the above-mentioned groove. The foot plate of the stapes is firmly imbedded in the fenestra ovalis; the remainder is missing. The incus was lost, possibly during preparation, though the malleus (pl. 5, fig. 4) was in place when the skull was placed in the writer's hands for description.

The postero-external face of the labyrinthic portion projects backward as a thin sheet or lamina of bone; internal to this process and on the posterior face there is a circular opening, the fenestra rotundum.

The most noticeable feature of this periotic is the circular concavity on the dorsal face, which, coupled with the location of the internal foramina, impart an unusual appearance to this bone. As seen from the dorsal view (pl. 5, fig. 1), the labyrinthic region is roughly triangular. Below the apex of this structure is a large elliptical opening, which is divided mesially by a thin, bony partition. The posterior fossa represents the internal acoustic meatus, at the bottom of which are three small circular depressions. The more internal one of these leads to a small opening, presumably the foramen centrale. The spiral tract is represented by the two remaining depressions. The fossa is approximately 7 mm. deep. The passage anterior to the internal acoustic meatus represent the internal opening of the facial canal, which pierces the pro-otic as mentioned above and then turns obliquely backward at the point where it enters the labyrinthic. Thus the pro-otic and labyrinthic portions of the facial canal form an acute angle with each other at their junction.

External to the internal acoustic meatus and anterior to the slitlike depression is a minute opening, which may possibly be the *aqueductus vestibuli.* Near the posterior margin of the labyrinthic and adjacent to the internal acoustic meatus is the opening of a small canal, which connects with the fenestra rotundum below it. The latter is the external aperture of the *aquaeductus cochleae.* There is a small concavity on the posterior face of the labyrinthic above the aperture of the *aquaeductus cochleae* and the internal acoustic meatus.

MEASUREMENTS OF THE PERIOTIC BONE.

	mm.
Greatest length of periotic (tip of anterior process to tip of posterior process)	82
Greatest depth of labyrinthic region of periotic	15.7
Greatest breadth of labyrinthic region of periotic	29.5
Length of posterior process or apophysis (external wall of groove for facial canal to tip of apophysis)	47
Greatest antero-posterior diameter of apophysis	26
Distance from apex of labyrinthic to tip of the process below foramen rotundum that projects backward and inward	30.7

TYMPANIC.

Perfect conjoined tympanic and periotic bones have not as yet been found in the Calvert Cliffs. Since the periotic and the tympanic bones of the Cetacea are joined together by two small processes they would hardly escape being broken apart while the skull was being rolled about by the water. In most of the Mystacoceti the periotic is firmly lodged and is held in place by the apophysis and the projecting edges of the squamosal bone. Hence the periotic is usually in place when the skull is excavated. In exceptional cases the tympanic bone is not dislodged by the action of the water, but in such cases the weight or pressure of the overlying beds breaks the connections and crushes the fragile processes which project from the tympanic. As a result of these destructive forces practically all of the tympanics found are fractured or broken.

The single tympanic bone (pl. 6, fig. 1*b*) which was found associated with the skull is imperfect; part of the thin outer lip, as well as the anterior process and the accessory ossicle borne by it, are missing. It was found that the fractured end of the posterior process of the tympanic fits into the corresponding surface of the fragment of this process that is ankylosed to the apophysis of the left periotic. The contact between the proximal and distal fragments of the posterior process is sufficiently close to justify the association of this tympanic with the left periotic.

The thick convex involuted portion of the tympanic (pl. 6, fig. 1*a*), or involucrum, is slightly and unequally depressed below the level of the overarching outer lip, and rather abruptly decreases in thickness anterior to the furrow on the outer lip, while in *Cetotherium* and *Megaptera* it gradually decreases in thickness to the anterior or eustachian angle. The dorsal surface of the involucrum shows the flattened or gently convex undulation which characterizes the tympanic bone of the baleen whales.

MEASUREMENTS OF THE TYMPANIC BONE.

	mm.
Greatest length of bulla	56
Greatest width of bulla	32
Greatest depth of bulla on internal side	31.7
Distance from antero-internal end of tympanic to anterior end of involucrum	23

DESCRIPTION OF TWO TYMPANICS.

Cat. No. 10722, Division of Vertebrate Palaeontology, U. S. National Museum.

As remarked above, practically all of the tympanic bones which are discovered are imperfect; the thin brittle outer lip which bends over the thick rounded involucrum or inner lip is usually damaged even in the best preserved specimens. However, a pair of tympanics in an exceptionally fine state of preservation were collected by William Palmer. Their size and proportions suggested comparison with *Parietobalaena.* The best preserved tympanic bone (pl. 6, figs. 2*a*, 2*b*) measures 52 mm. in length. This tympanic resembles *Parietobalaena* (pl. 6, fig. 1*a*) in the relative thicknesses of the convex and the concave portions of the involucrum, in the contour of the eustachian end of the cavity, in the proportions of the posterior conical apophysis (pl. 6, fig. 1*b*), and in the general outlines of the tympanic as a whole. This left tympanic is sufficiently entire to show the form of the tympanic cavity which is bounded by the overarching outer lip, and the size and direction of its anterior outlet or tympanic aperture of the eustachian canal.

The anterior process of the right tympanic (pl. 6, fig. 3*b*), which unites with the periotic, is broken off at the level of the outer lip. There is a deep groove on the tympanic between the *processus sigmoideus* and the so-called posterior conical apophysis of Beauregard. This apophysis is rounded and projects but slightly above the superior face of the involucrum.

The posterior process projects mainly from the involucrum, although the outer lip posterior to the conical apophysis contributes the thin edged outer margin. The tympanic cavity is continued forward without interruption to the anterior end of that bone and the outlet is relatively narrower than in *Idiocetus laxatus.*[11]

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[11] Van Beneden, P. J., Description des ossements fossiles des environs d'Anvers. Part 5. Annales du Musée Royal d'histoire Naturelle de Belgique, Bruxelles, vol. 13, pl. 56, figs. 3, 10, 1886.

The thinner portion of the involucrum is distinctly continued forward to the anterior limit of the tympanic cavity; the convexity of the postero-internal portion of the involucrum abruptly subsides, while the anterior portion becomes decidedly concave. The inner surface of the outer lip of the left tympanic is very rugged opposite the convex portion of the involucrum, but this may be due to a pathological condition for the same surface on the right tympanic is perfectly smooth.

The ventral surface of the tympanic bone (pl. 6, fig. 2*a*) maintains a more equable breadth from the posterior to the anterior end, the antero-external and the postero-interal angles of which are rounded. The anterior and posterior faces of the tympanic slope obliquely backward from the internal to the external margins.

The characters derivable from the tympanic bones are sufficiently diagnostic to be used as a guide in the determination of species. In regard to the differences which are observable in the tympanic bones of *Parietobalaena*, *Cetotherium*, *Idiocetus*, and the form under discussion, it may be said that, though seemingly of slight importance, they afford a means of distinguishing the various species. The peculiar features of the two tympanics described above are sufficiently marked to justify their being regarded as belonging to a distinct species, but nearest allied to *Parietobalaena palmeri*. There is a strong possibility that these tympanics belong to one of the previously described fossil cetaceans of the Calvert formation, but no definite allocation will be made until more material is available for study.

MEASUREMENTS OF THE TYMPANIC BONES.

	mm.
Greatest length of right bulla	52.5
Greatest length of left bulla	52
Greatest width of right bulla	30
Greatest width of left bulla	30.7
Greatest depth of right bulla on internal side	29
Greatest depth of left bulla on internal side	29
Greatest depth of right bulla on external side (ventral face to tip of *processus sigmoideus*)	40
Distance from antero-internal end of right tympanic to anterior end of involucrum	18.5
Distance from antero-internal end of left tympanic to anterior end of involucrum	19.5

EXPLANATION OF PLATES.

Parietobalaena palmeri, new genus and species. Cat. No. 10,668, Division of Vertebrate Palaeontology, United States National Museum. Calvert formation, western shore of Chesapeake Bay, 1 mile above Dare's Wharf, Calvert County, Maryland. Collected by William Palmer, August 14, 1913.

PLATE 1.

Dorsal view of skull of *Parietobalaena palmeri*. About one-third natural size. Abbreviations: *C.* condyle; *Ex. o.* exoccipital; *Fr.* frontal; *Max. s.* maxillary sutures; *Na. s.* nasal sutures; *Pa.* parietal; *Pmx. s.* premaxillary sutures; *Po. p.* postorbital projection of frontal; *Pr. p.* preorbital projection of frontal; *So.* supraoccipital; *Sq.* squamosal.

PLATE 2.

Posterior view of skull of *Parietobalaena palmeri*. About seven-sixteenths natural size. Abbreviations: *Bo.* basioccipital; *C.* condyle; *Ex, o.* exoccipital; *Fo. m.* foramen magnum; *Meat. aud. ext.* meatus auditorius externus; *Pa.* parietal; *Po. gl. p.* postglenoid process; *Po. p.* postorbital projection of frontal; *So.* supraoccipital; *Sq.* squamosal.

PLATE 3.

Lateral view of skull of *Parietobalaena palmeri*. About one-half natural size. Abbreviations: *Ex. o.* exoccipital; *Ex. pt.* external pterygoid; *Fo. ov.* foramen ovale; *Fr.* frontal; *Meat. aud. ext.* meatus auditorius externus; *Pa.* parietal; *Po. gl. p.* postglenoid process; *Po. p.* postorbital projection; *Pr. p.* preorbital projection; *Sph. f.* sphenoidal fissure; *Sq.* squamosal.

PLATE 4.

Ventral view of skull of *Parietobalaena palmeri*. About one-third natural size. Abbreviations: *Ap. per.* apophysis of periotic; *Bo.* basioccipital; *Bs.* basisphenoid; *C.* condyle; *Can opt.* canalis opticus; *Ex. o.* exoccipital; *Ex. pt.* external pterygoid; *Fo. opt.* foramen opticus; *Fo. ov.* foramen ovale; *Fr.* frontal; *Fo. lac. post.* foramen lacerum posterius; *Gl. f.* glenoid fossa; *In. pt.* internal pterygoid; *Meat. aud. ext.* meatus auditorius externus; *Per.* periotic; *Po. gl. p.* postglenoid process of squamosal; *Po. p.* postorbital projection of frontal; *Pr. falc.* processus falciformis; *Pr. p.* preorbital projection of frontal; *Prs.* presphenoid; *S. or. pr.* supraorbital process of frontal; *Sq.* squamosal; *Zyg.* zygomatic process of squamosal.

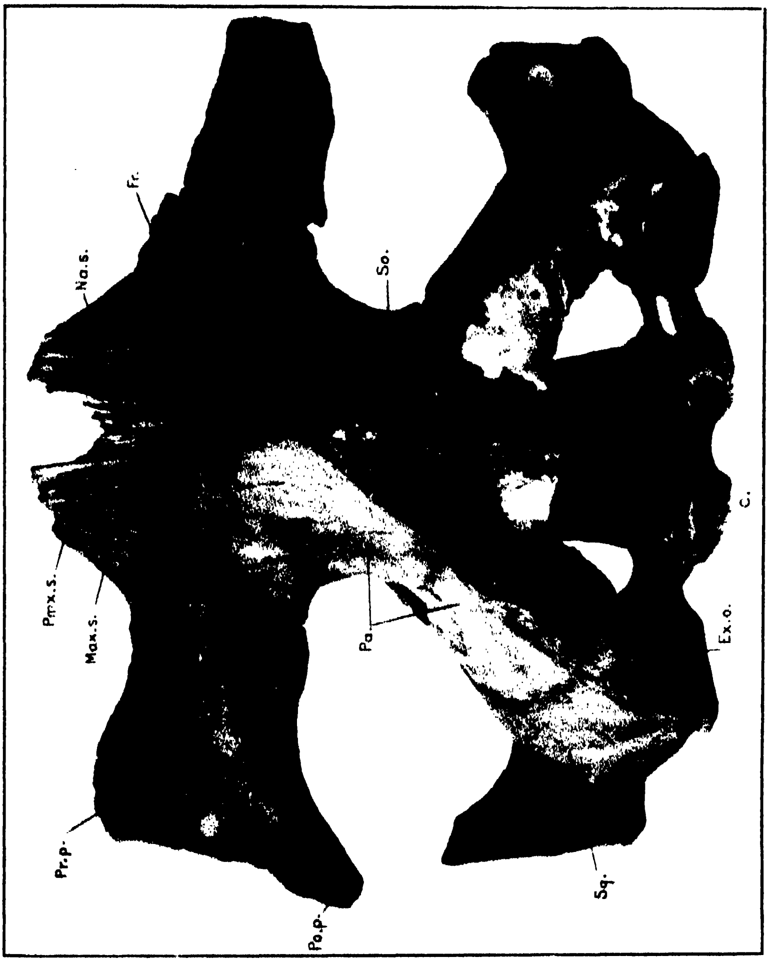
PLATE 5.

Right periotic of *Parietobalaena palmeri*. Fig. 1, Superior view about five-eighths natural size; Fig. 2, Superior view, posterior apophysis removed, about three-fourths natural size; Fig. 3, Inferior view, about five-eighths natural size; Fig. 4, Inferior view, posterior apophysis removed, malleus in place, about three-fourths natural size. Abbreviations: *A. M.* internal acoustic meatus: *A. ped.* anterior pedicle; *Aq. c.* aquaeductus cochleae; *Aq. v.* aquaeductus vestibuli; *F. C.* facial canal; *F. ov.* fenestra ovalis; *F.* and *F. r.* fenestra rotundum; *Incus* (this is not the *incus* as stated in text and should be labeled *malleus*); *Pr. a. pt.* processus anterior petrosi; *Pr. po. pt.* processus posterior petrosi.

PLATE 6.

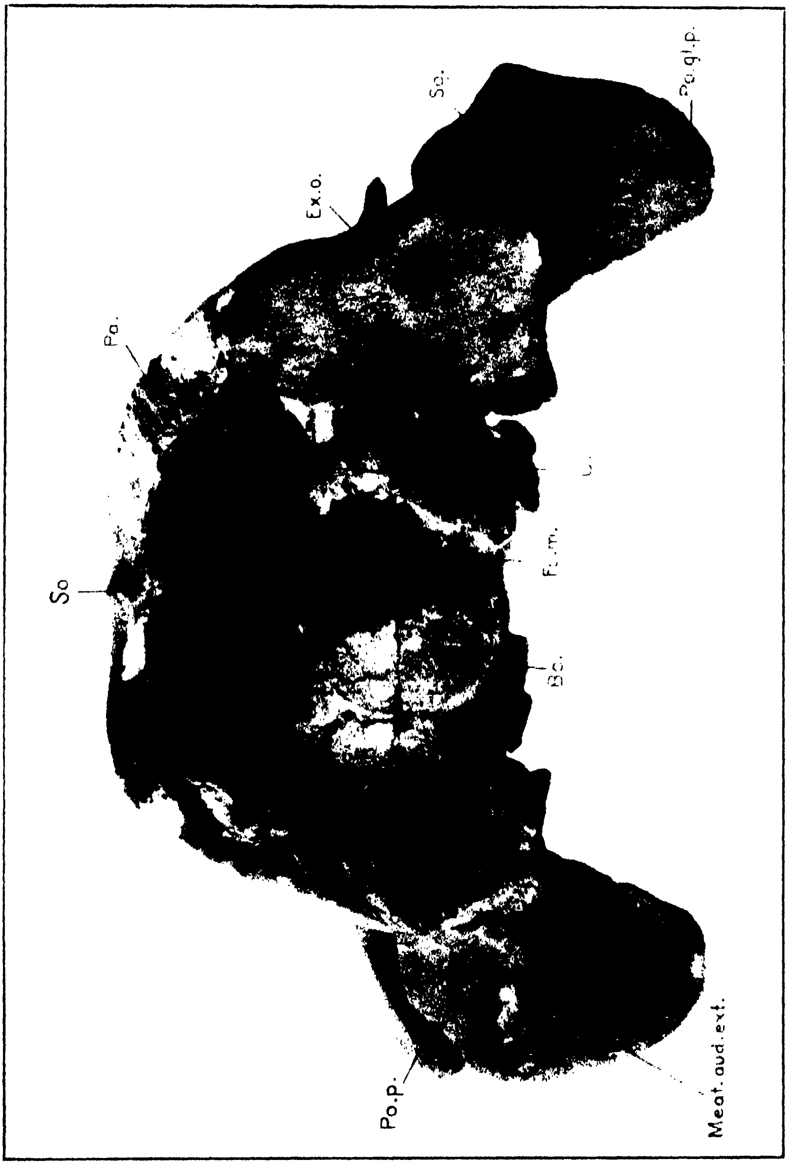
Left tympanic of *Parietobalaena palmeri*. Fig. 1*a*, Superior view; Fig. 1*b*, External view.

Tympanic bones of undetermined fossil cetacean, Cat. No. 10, 722, United States National Museum. Fig. 2*a*, Left tympanic, Inferior view; Fig. 2*b*, Left tympanic, External view; Fig. 3*a*, Right tympanic, Superior view; Fig. 3*b*, Right tympanic. External view. Figures about five-sevenths natural size.



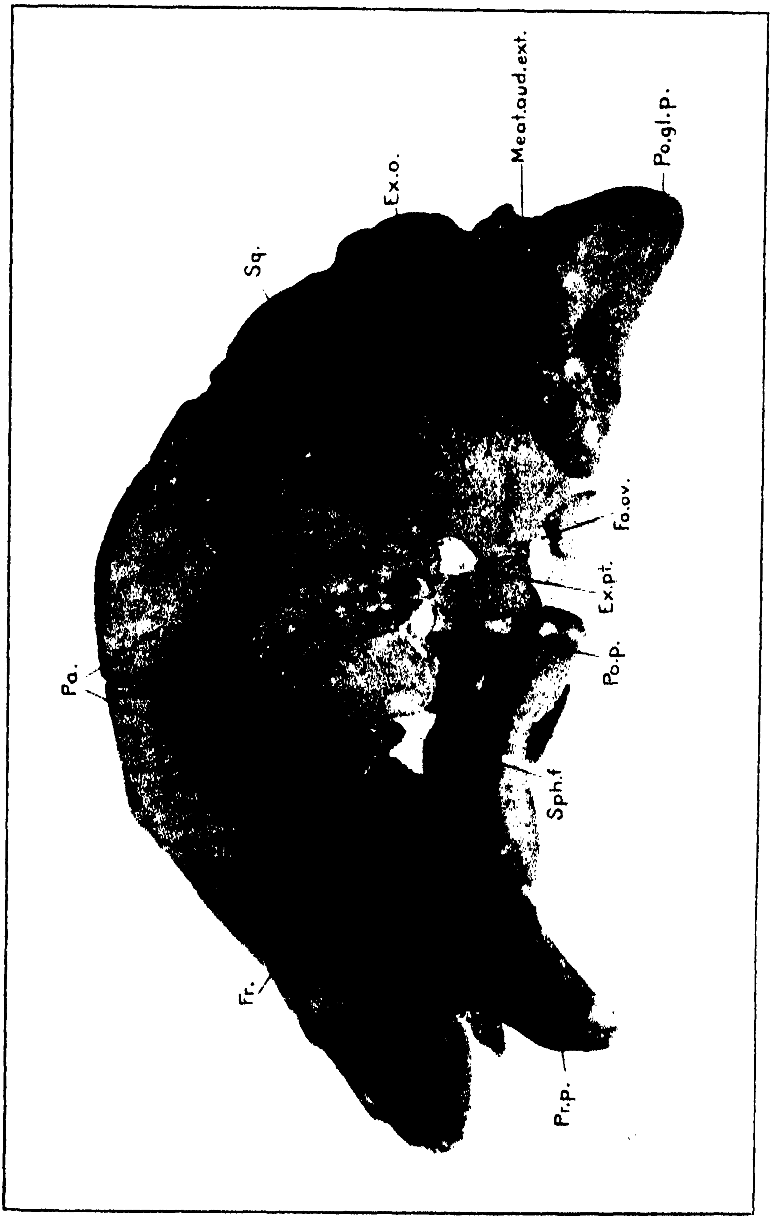
DORSAL VIEW OF SKULL OF PARIETOBALAENA PALMERI.

FOR EXPLANATION OF PLATE SEE PAGE 14.



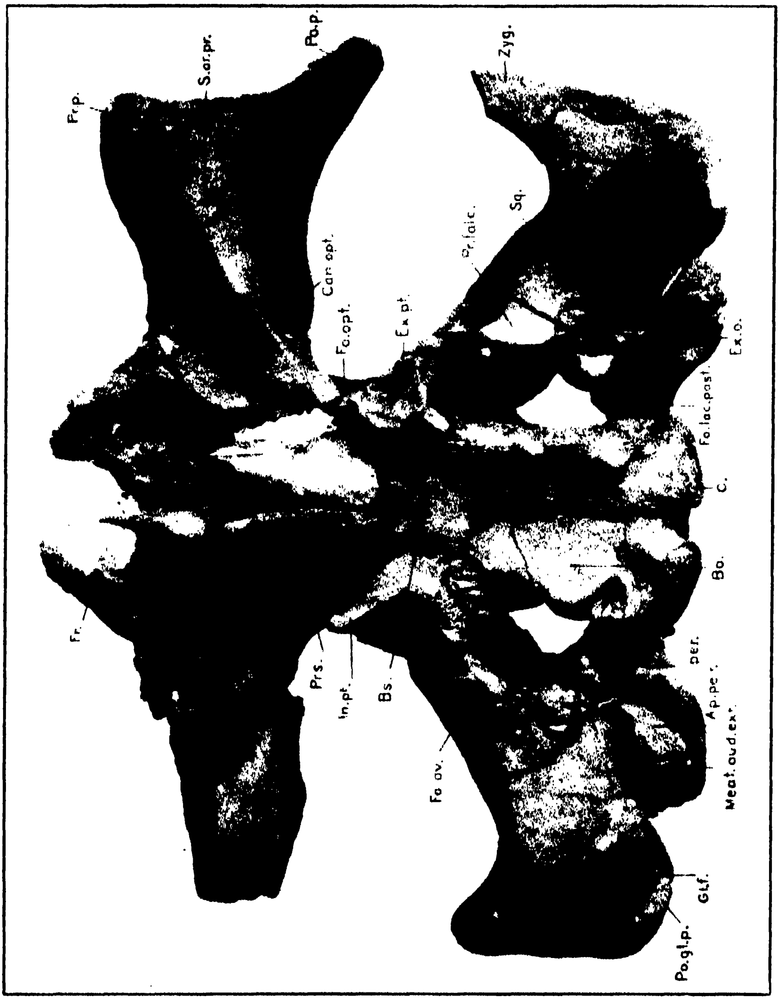
POSTERIOR VIEW OF SKULL OF PARIETOBALAENA PALMERI.

FOR EXPLANATION OF PLATE SEE PAGE 14



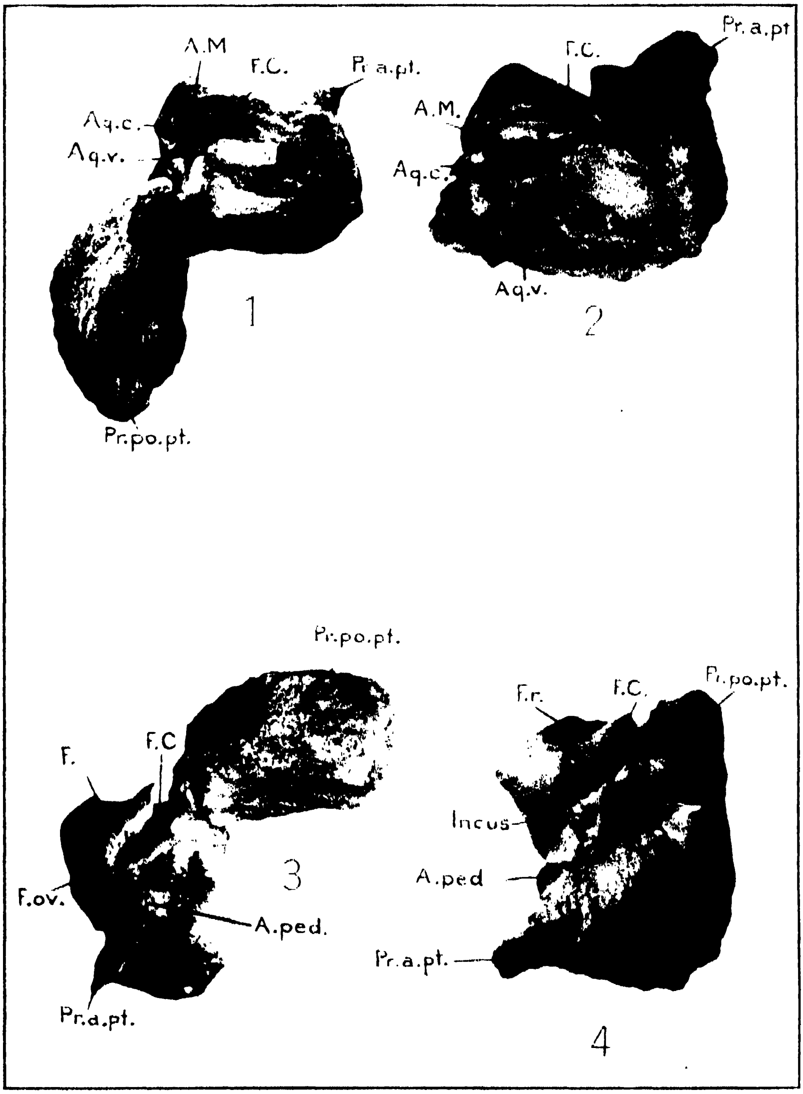
LATERAL VIEW OF SKULL OF PARIETOBALAENA PALMERI.

FOR EXPLANATION OF PLATE SEE PAGE 14.



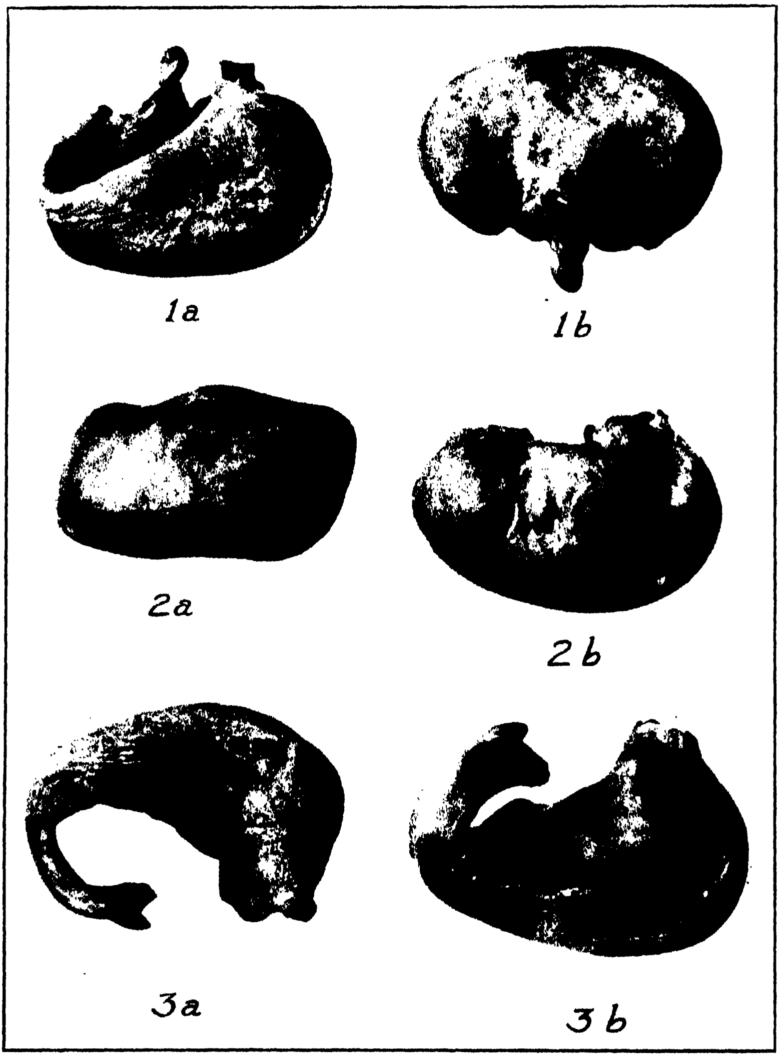
VENTRAL VIEW OF SKULL OF PARIETOBALAENA PALMERI.

FOR EXPLANATION OF PLATE SEE PAGE 14.



VIEWS OF RIGHT PERIOTIC OF PARIETOBALAENA PALMERI.

FOR EXPLANATION OF PLATE SEE PAGE 14.



1a 1b

2a 2b

3a 3b

VIEWS OF TYMPANIC BONES.

FOR EXPLANATION OF PLATE SEE PAGE 14.

REVISION OF THE NORTH AMERICAN WASPS OF THE SUBFAMILY PLATYGASTERINAE.

By Robert M. Fouts,

Of Washington, District of Columbia.

INTRODUCTION.

In taking up the study of the Superfamily Serphoidea in 1915 the writer experienced from the first great difficulty in identifying the various wasps belonging to the large and important Family Platygasteridae. It was in fact impossible to name any species with certainty by the use of the literature available. Ashmead 's Monograph of the North American Proctotrypidae, the only work pretending to deal in an exhaustive manner with the group as a whole, is very unsatisfactory, and the present effort is intended to be a thorough revision of a portion of it, namely, the Tribe II, Platygasterini.

As to my method in drawing up this work I may say that I have described fully all of the species known from America north of Mexico. The descriptions are made, as far as possible, in a relative manner. This enables me to omit many useless characteristics such as the pubescence on the thorax, the shape and vestiture of the legs, etc. Descriptions made in an absolute sense seem less useful. The reader is distracted from points more worthy of his attention and valuable time is thereby lost. It is only when one has the types that one can generalize in this way. Isolated descriptions, especially in the large and difficult genus *Platygaster*, should be made with attention to detail. It is patent that the author of such a description could not know absolutely which were the important characteristics and which the unimportant. It is the duty of the monographer to eliminate the commonplace and useless from such descriptions. I may say finally that, except for the various drawings made by Ashmead, this work entirely supplants that part of his Monograph dealing with the Tribe Platygasterini.

A Bausch & Lomb binocular microscope (No. 5 ocular and 24 mm. objective) has been used in the study and comparison of specimens. A disk micrometer, graduated to tenths of a millimeter was used for all measurements. The figures of the antennae in the genus *Leptacis* were made by the author from sketches prepared by Miss Eleanor Armstrong, an artist in the employ of the Department of Agriculture. The other drawings were made by the author.

The manuscript for this paper was completed in the autumn of 1921 and it has been inadvisable to bring the bibliography of all the species up to date. All of the necessary references to the classification have, however, been added.

PREPARATION.

No special preparation in mounting is necessary with these insects. They are hard and almost indestructible if ordinary precautions are taken. The best way of mounting is to fasten them with shellac to the tips of card points. One specimen should be attached to a point, the latter to be pierced at its broader end by an insect pin. By this means specimens may be preserved indefinitely. There are some so mounted in the National Collection which, although collected many years ago, are still in perfect condition.

It is not advisable to mount the entire specimen on a slide. This may be done with advantage in the case of certain Chalcids but not here. One should, however, mount the antennae in balsam on a slide. In several genera (*Platygaster, Leptacis*) the structure of the antennae is of importance in classification.

ACKNOWLEDGMENTS.

The writer is indebted to Mr. S. A. Rohwer, custodian of Hymenoptera, for encouragement and numerous useful suggestions. He has also helped in the general arrangement of the work.

Subfamily PLATYGASTERINAE.

Characters.—Wings veinless; mandibles bidentate; antenna nine or ten jointed, frequently clavate in the female; abdomen petiolate, carinate laterally, composed of six segments in the female and of seven in the male; legs slender, pubescent, with five-jointed tarsi.

The group may be easily recognized by the use of the diagnosis just given. No other group in the Order Hymenoptera has veinless wings.

All of the species are small, none that I have seen being over 4 millimeters in length. Records show that nearly all reared forms are parasitic on the flies of the Family Itonidae. Records of different rearings are in every case doubtful. (See description of *Amitus aleurodinis* Haldeman.)

TABLE TO GENERA.

1. Scutellum densely and evenly covered with appressed pubescence; last two antennal joints in female closely joined............ I. **Amblyaspis** Foerster.
Scutellum not densely and evenly covered with appressed pubescence; terminal antennal joints not closely jointed.. 2.
2. Scutellum flattened.. 3.
Scutellum not especially flat, either convex or subconvex................ 6.
3. Antenna in both sexes nine-jointed.................. II. **Fidiobia** Ashmead.
Antenna in both sexes ten-jointed.. 4.
4. Terminal three or four joints in the female antenna forming a club......... 5.
Antennae filiform or clavate but the club not formed by a special differentiation in the size of the terminal three or four antennal joints.
VIII. **Platygaster** Latreille.
5. Antennal club in female three-jointed................ III. **Amitus** Haldeman.
Antennal club in female four-jointed.................. XI. **Leptacis** Foerster.
6. Antennal club in female three-jointed...................................... 7.
Antenna without a three-jointed club.. 8.
7. Propodeum not visible in a dorsal view of the insect... III. **Amitus** Haldeman.
Propodeum sloping, visible in a dorsal view......... IV. **Isorhombus** Foerster.
8. Second tergite with two basal foveae; antenna in female without a club formed by special enlargement of the last four joints.......................... 9.
Second tergite without foveae and never with striae basally; antenna of female with a four-jointed club.. 12.
9. Scutellum with a tuft of hair above; if the tuft is not distinct then the scutellum is very high, conical when seen from the side.......................... 10.
Scutellum without a trace of such a tuft, not high and conical............. 11.
10. Head cubical seen from above, very full above and behind the eyes.
V. **Isocybus** Foerster.
Head usually distinctly transverse, if somewhat cubical then not so full above and behind the eyes................................ VI. **Trichacis** Foerster.
11. Head with a sharp tooth-like projection between the antennae.
VII. **Eritrissomerus** Ashmead.
Head without such a projection.................. VIII. **Platygaster** Latreille.
12. Thorax strongly compressed; head flattened antero-posteriorly; abdomen flattened... IX. **Piestopleura** Foerster.
Thorax not noticeably compressed; head and abdomen not especially flat. 13.
13. Second sternite in female depending sack-like below the second tergite, the following segments forming a tail.................. X. **Sactogaster** Foerster.
Abdomen normal.................................... XI. **Leptacis** Foerster.

I. Genus AMBLYASPIS Foerster.

Amblyaspis FOERSTER, Hym. Stud., Heft 2, 1856, pp. 107, 112. *Genotype.—A. aliena* Foerster (By original designation). Three species.
Amblyaspis FOERSTER, Ashmead (part), Bull. 45, U. S. Nat. Mus., 1893, p. 266.

Head transverse, more or less circular seen from in front; occiput margined or immargined; ocellocular line usually greater than the lateral ocellar; antennae in both sexes ten-jointed, with a more or less distinct four-jointed club in the female; joints three and four rather large and thick, subequal, thicker than the pedicel or joints five and six; last two joints of the club closely joined; antenna of male more or less similar to that found in *Platygaster*, the joints cylindrical, loosely joined, thickly covered with short pubescence; thorax longer than wide, higher than wide, convex above; notauli usually absent, sometimes complete; mesonotum separated from the scutellum by a suture; scutellum more or less triangular in outline, rounded apically, thickly covered with appressed pubescence; propodeum with two parallel, median, elevated carinae; propodeum on each side with a ridge running from the base of the posterior wing to the base of the hind coxa; wings pubescent, distinctly ciliate marginally; abdomen as in *Platygaster* but the second tergite not striate and the basal foveae frequently indistinct; in the specimens studied the abdomen in the female is in no instance much longer than the head and thorax united.

TABLE TO SPECIES.

1. Abdomen in female twice as long as wide............. 1. **californicus** Ashmead.
Abdomen in female distinctly less than twice as long as wide............... 2.
2. Abdomen short, 0.60 mm. long...................... 2. **occidentalis** Ashmead.
Abdomen longer, 1.77 mm. long........................ 3. **petiolatus** Ashmead.

1. AMBLYASPIS CALIFORNICUS Ashmead.

Amblyaspis californicus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 268.

Female.—Length 1.7 mm. Head twice as wide as long, as wide as the thorax; frons very faintly reticulate, subopaque; lateral ocelli nearer to the anterior ocellus than to the eye margin; vertex bounded posteriorly by a high and sharp ridge; flagellum three-fourths as long as the abdomen, the joints thickly covered with short white hairs; pedicel shorter than joints three and four united, two and one-half times as long as wide; joints three and four thicker, a little longer than wide; joints seven to nine quadrate, slightly produced apically on the outside; last joint conical, as long as the ninth, a little longer than wide; thorax elliptical seen from above, convex dorsally, two-thirds as wide as long; mesonotum faintly reticulate, subopaque, squarely excised posteriorly; notauli absent; abdomen as long as the head and thorax united, as wide as the thorax, polished, the apical tergites punctulate. Mahogany-colored; scape reddish-yellow, tinged with fuscous toward the apex; pedicel and flagellum dark brown; legs yellow, the posterior coxae and posterior femora apically a little darker.

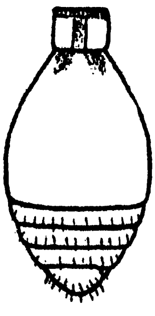


FIG. 1.—AMBLYASPIS CALIFORNICUS ASHMEAD. ABDOMEN OF FEMALE.

Male.—Length 1.35 mm. Flagellum, including the pedicel, as long as the thorax, the joints cylindrical and covered with short erect hairs; all antennal joints except the third longer than wide; fourth joint twice as long as the third, cylindrical, two times as long as wide; joints six to nine subequal, not much longer than wide; joint ten conical, sharp at apex, longer than four; abdomen as long as the head and thorax united, as wide as the thorax, four-sevenths times as wide as long, rounded apically; wings long, pubescent, ciliate, tinged with brown.

Type locality.—Marin County, California.

Type.—Cat. No. 2267, U.S.N.M.

Redescribed from the type female and allotype male.

2. AMBLYASPIS OCCIDENTALIS Ashmead.

Amblyaspis occidentalis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 267.

Female.—Length 0.8 mm. Whole specimen, except the abdomen, lost; "polished black, impunctured; antennae brown black, the scape pale at base; legs brownish, trochanters, base of tibiae and tarsi, honey yellow. Antennae ten-jointed: pedicel a little shorter than the first two funiclar joints together; first and second funiclar joints equal, third much shorter and more slender, fourth transverse; club four-jointed, the last two joints closely united, the first two about equal, a little wider than long, rounded off at base. Scutellum triangular, pubescent, very slightly impressed on each side at base, but medially subconvex and not separated from the mesonotum. Metathorax and metapleura pubescent. Wings hyaline. Abdomen as long as the head and thorax together, black, polished, the petiole and base of second segment pubescent"; abdomen distinctly less than twice as long as wide, the last segment alone punctate; second tergite a little longer than wide, nearly twice as wide apically as at base; tergites three to five very short, polished, broadly transverse.

Type locality.—Riley County, Kansas.

Type.—Cat. No. 25425, U.S.N.M.

Redescribed from the type specimen.

3. AMBLYASPIS PETIOLATUS Ashmead.

Amblyaspis petiolatus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 268, female and male.—BRUES, Bull. No. 22, Conn. Geol. and Nat. Hist. Survey, 1916, p. 583.

Female.—Length 1.33 mm. Head less than twice as wide as long, not emarginate behind, as wide as the thorax; frons finely reticulate, subopaque; vertex immargined posteriorly; lateral ocelli nearer to the eye margin than to the anterior ocellus; pedicel twice as long as wide, scarcely longer than the third antennal joint; joints eight and nine hardly longer than wide, not produced outwardly as in *californicus*; ten conical, sharply pointed apically, longer than nine; thorax a little over two-thirds as wide as long, convex above, as high as wide; mesonotum faintly reticulate; notauli present, widely separated in front of the scutellum, reaching to the middle of the mesonotum; median lobe of mesonotum truncate posteriorly, touching the scutellum; abdomen a little longer than the head and thorax united, wider than the thorax, less than twice as long as wide, elliptical posterior to the petiole; second tergite as wide as long, widest at the apex where it is twice as wide as at base; following segments united half as long as the second, each one finely punctate, broadly transverse; sixth tergite as long as the two preceding united, broadly rounded apically. Dark reddish brown; legs and antennae (except flagellum) bright yellow; flagellum and petiole yellowish-brown; tegulae rufous posteriorly.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25426, U.S.N.M.

Redescribed from the type. The allotype has been lost or misplaced.

II. Genus FIDIOBIA Ashmead.

Fidiobia ASHMEAD, Journ. Cincinnati Soc. Nat. Hist., 1895, p. 171. (Monobasic.)
Genotype.—*Fidiobia flavipes* Ashmead.
Rosneta BRUES, Bull. Wis. Nat. Hist. Soc., vol. 6, 1908, p. 157. (Monobasic.)
Genotype.—*Rosneta tritici* Brues.

Head transverse, wider than high seen from in front; vertex rounded; lateral ocelli nearer to the eye margin than to the front ocellus; antennae in the female nine-jointed, short, with a three-jointed club, funicle four-jointed, filiform; antennae in the male nine-jointed, with a distinct three-jointed club; third joint as long and as thick as the second, longer than wide; fourth broadly transverse, very thin; fifth and sixth short, rounded, longer than the fourth; thorax flattened; pronotum seen from above appearing as a transverse curved line, thicker just in front of the tegulae; mesonotum transverse, separated from the scutellum by a fine suture; notauli indicated by broad gashes in the posterior half of the mesoscutum; scutellum broadly transverse, margined laterally; propodeum shorter than the scutellum, with lateral ridges and with two dorsal longitudinal carinae; wings veinless, pubescent, not distinctly ciliate at their margins; abdomen flattened, with no strong growth of pubescence on it; first tergite transverse, with two lateral foveae at its base separated by a median elevation; second tergite longer than wide, with two lateral basal foveae and a shallow depression between the elevations separating them.

Two valid species are known in this genus. Both are found in the Eastern States. *E. flavipes* is recorded as being parasitic in the eggs of *Fidia viticida* on grape vine. It is strange that the species is so often found in sweeping wheat stubble but that the specimens so procured are really *flavipes*, I entertain no doubt for I have compared a number of them with the types. *Rosneta tritici* Brues is identical with *flavipes*. The difference in the length of the abdomen is not of any significance since the apical segments are telescopic.

1. FIDIOBIA FLAVIPES Ashmead.

Fidiobia flavipes Ashmead, Cincinnati Soc. Nat. Hist., 1894, p. 171.
Rometa tritici Brues, Bull. Wisc. Nat. Hist. Soc., vol. 6, 1908, p. 157.

Female.—Length 0.70 mm. Body somewhat flattened; head as wide as the thorax, twice as wide as long, finely shagreened; frons faintly aciculate, more strongly so below; thorax a trifle longer than wide, broadly rounded anteriorly, narrowed behind the tegulae, with no sculpture to speak of unless it be a faint shagreening; notauli present on posterior half of mesonotum, shallow and broad; scutellum twice as wide as long, polished; abdomen as wide as the head, gradually narrowed anteriorly, as long as the head and thorax united, two-thirds as wide as long, without sculpture and without pubescence; first tergite two and one-half times as wide as long, narrowed anteriorly; second tergite oblong, the sides nearly parallel, slightly over two-thirds as wide as long; basal lateral foveae oblique, shallow, not attaining the middle of the segment; segments two—five mostly concealed beneath the large second segment, narrow if visible at all, sixth segment triangular, wider than long; wings extending half the length of the second segment past the apex of the abdomen, subhyaline, pubescent. Castaneous; legs and antennae stramineous.

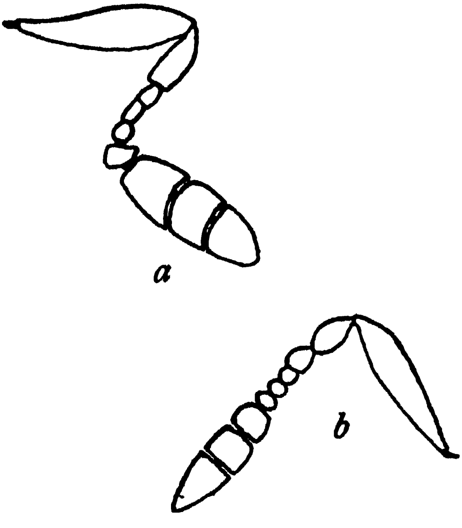


Fig. 2.—Fidiobia flavipes Ashmead. Antennae. a. of the female. b. of the male.

Male.—Length 0.70 mm. Differs little from the female except in secondary sexual characters. The antennae of both the male and the female are shown greatly enlarged, in the accompanying illustration.

Type locality.—Ohio.

Type.—Cat. No. 1449, U.S.N.M. Type selected, also 2 paratypes.

The description of the female is based upon the type material in the collection of the United States National Museum. The male is described, or rather its antenna figured, from one of a series of specimens labeled "Ithaca, N. Y., M. V. Slingerland, collector." This series is now deposited in the national collection along with the Ashmead types.

The types were reared by Prof. F. M. Webster from the eggs of *Fidia viticida* on grapevine. I do not know the host of Mr. Slingerland's specimens.

2. FIDIOBIA RUGOSIFRONS Crawford.

Fidiobia rugosifrons CRAWFORD, Ins. Insct. Menst., vol. 4, 1916, p. 141.

Closely allied to *F. flavipes* Ashmead from which it differs in its slightly larger size, more pronounced coloring, and coarser sculpture.

Female.—Length 0.90 mm. Differs from the corresponding sex in *flavipes* in the following manner: Body of a shining black color; antennal club dark brown; the head and most of the thorax, the scutellum excepted, covered with a fine thimble-like sculpture; fourth antennal joint distinctly shorter than the third.

Male.—Length 0.80 mm. Similar to the female. Differs from the male of *flavipes* in the antennal structure, which difference can be readily noted by comparing the accompanying figures.

Type locality.—Montourville, Pennsylvania.

Type.—Cat. No. 20786, U.S.N.M. Female and male.

Described from types which bear the additional data, "reared from eggs in wheat stubble; P. R. Myers; Coll.; emerged Apr. 17, 1916."

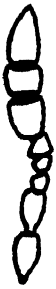


FIG. 3.—FIDIOBIA RUGOSIFRONS CRAWFORD. ANTENNAE OF MALE. SCAPE NOT SHOWN.

Mr. Crawford was mistaken in taking both of his specimens for females. His mistake was not surprising, however, since his accuracy was unquestioned until the antennae of both specimens had been mounted and compared.

III. Genus AMITUS Haldeman.

Amitus HALDEMAN, Amer. Journ. Sci., ser. 2, vol. 9, 1850, p. 109. (Monobasic.) *Genotype.*—*A. aleurodinis* Haldeman.

Zacrita FOERSTER, Kleine Monographie, 1878, p. 46. (Monobasic.) *Genotype.*—*Z. longicornis* Foerster.

Head transverse; occiput not margined; lateral ocelli as near to the eye margin as to the front ocellus; antennae in female ten-jointed, with the last three joints closely united and forming a club; scape curved, not especially long; joints three, four, and five rather elongate, several times longer than wide; antennae in male ten-jointed, filiform, with all the flagellar joints longer than wide and densely covered with short erect hairs; scape strongly bowed, not long or thick; fourth joint cylindrical, not deformed in any way; thorax more or less flattened above, wider than high; mesonotum large; pronotum narrow seen from above; notauli complete or incomplete; scutellum flattened or convex, unarmed; median episternal groove deep, curved;

metanotum laminate; propodeum not visible from above, perpendicular, without median carinae; abdomen short and broad, not longer than the thorax, composed of six segments in the female and of seven in the male; second tergite striate basally, with two lateral basal foveae; legs slender, with five-jointed tarsi; wings hyaline, pubescent, with long marginal cilia.

1. AMITUS ALEURODINIS Haldeman.

Amitus aleurodinis HALDEMAN, Amer. Journ. Sci., ser. 2, vol. 9, 1850, p. 110.
Elaptus aleurodis FORBES, 14th Ill. Rep., 1884, p. 110, pl. 2, fig. 6; female.
Alaptus aleurodis FORBES, Cresson, Syn. N. Amer. Hym., 1887, p. 250.

Head twice as wide as long, as wide as the thorax, slightly emarginate posteriorly, entirely finely reticulate; thorax scarcely longer than wide, mostly finely reticulate; notauli complete, separated behind, diverging widely anteriorly; scutellum convex, bare, faintly reticulate, its apex extending posterior to the apex of the propodeum, the latter visible only as a transverse line, narrower than the metanotum; legs moderately slender, mostly rufous like the rest of the body; tarsi a little paler, dirty yellow in color; wings one-fourth of their own length longer than the entire insect, broad, with long cilia marginally.

Female.—Length 0.84 mm. Pedicel as long as but thicker than the third antennal joint, as wide as the fifth, two and one-half times as long as wide; joint four slender, about as long as but thicker than the third, slightly narrower than the fifth; joint five twice as long as wide, a little shorter than the fourth, slightly longer and narrower than the sixth; seventh scarcely longer than wide, wider than the sixth; joints eight to ten forming a solid club more than three times as long as wide, the parts of which can be distinguished only under the higher powers of the microscope; club not much wider than joint seven, acute apically, without distinct pubescence; abdomen circular seen from above, pointed apically, a little wider than the thorax; second tergite reticulate with shallow striae, the striae nearly reaching the posterior margin of the segment; second tergite three-fourths as long as wide; following segments short, broadly transverse, unsculptured; sixth tergite triangular, transverse, acute at apex; antennae yellow, the joints beyond the third brownish.

Male.—Length 0.88 mm. Pedicel hardly longer than wide, as wide as the scape, the latter a little wider than any of the flagellar joints; joints three to ten subequal in width; three twice as long as wide, shorter than four; joints four to nine gradually shortening distally, the eighth twice as long as wide; joint ten over twice as long as wide, a little longer than the fourth, pointed apically; abdomen rounded; distinctly longer than wide, as wide as the thorax; second tergite as in the female; following ones polished, transverse, the seventh acute apically; antennae yellowish.

Type locality.—Illinois.

Type.—In collection of American Entomological Society.

Other localities.—Pennsylvania and District of Columbia.

Redescribed from a series of specimens in the National Museum labeled, "Par. on Aleurodes on Maple leaves; issued Feb. 6, 1874."

I quote Professor Haldeman on the habits of the species:

> Parasitic on the larva of *Aleurodes corni* Hald., of which it destroys a great many. I found it with that insect beneath the leaves of *Cornus sericea* on the margin of a water course. It leaps, walks, and flies with facility, and when touched simulates death. I have kept them a week or more, living in confinement. The ova (crushed from the ovaries) are fusiform, rounded at one extremity and produced at the other like the neck of a flask.

IV. Genus ISORHOMBUS Foerster.

Isorhombus FOERSTER, Hym. Stud., Heft 2, 1856, pp. 107, 113. No species originally included.

Vertex seen from in front highly elevated; that part of the head bounded by a line drawn from the middle point of the vertex to the outer margins of the eyes and from thence to the mouth forming a perfect diamond-shaped figure; occiput not separated from the vertex by a sharp carina; antennal club in female three-jointed. Genus in other respects similar to *Leptacis*.

I have seen no specimens referable to this genus. The two species included by Ashmead[1] belong to other genera in the subfamily. *I. hyalinipennis* Ashmead is referred to *Platygaster* and *arizonensis* Ashmead to *Trichacis*.

V. Genus ISOCYBUS Foerster.

Isocybus FOERSTER, Hym. Stud., Heft. 2, 1856, p. 114. Four species. *Genotype.*—(*Platygaster ruficornis* Walker)=*Platygaster grandis* Nees. By original designation.

This genus is closely related to *Platygaster* Latreille and *Trichacis* Foerster. It may be separated from the former only by the shape of the head, which is more or less cubical, very full behind and above the eyes. As in *Trichacis* the scutellum is of an irregular shape, never smoothly rounded above and evenly sculptured, and has a more or less distinct tuft of hair above. In *Platygaster* the pubescence is scattered and always denser on the sides than on the top. The abdomen is six segmented in the female and seven in the male. The second tergite is not densely pubescent proximally and has two basal foveae.

Foerster[2] designated as type the species described by Walker[3] under the name *Platygaster ruficornis* Latreille. *P. ruficornis*

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[1] Bull. 45, U. S. Nat. Mus., 1893, pp. 276 and 277.

[2] Hym. Stud., Heft. 2, 1856, p. 114.

[3] Ent. Mag., vol. 3, 1835, p. 249.

(Latreille) Walker is not Latreille's species and has been synonymized with *Platygaster grandis* Nees by Dalla Torre.[4] In the National Museum there is one specimen from Europe labeled "Essex, England, *Isocybus grandis* Nees." I do not know who labeled the specimen but it agrees pretty well with Nees' description.[5] Compared with specimens of *canadensis* (Provancher) I can find few differences, none fundamental, the most important of which are the slightly coarser sculpture of the mesonotum and the darker color of the antennae.

Only one species is known from North America. The two others included in this genus by Ashmead[6] do not agree with the diagnosis given above and are placed elsewhere. *Platygaster pallipes* Say is retained as a doubtful species in *Platygaster*. *Isocybus longiventris* Ashmead is redescribed in the same genus.

1. ISOCYBUS CANADENSIS (Provancher).

Platygaster canadensis PROVANCHER, Addit. Fauna Ent. Can. Hym., p. 181.

Monocrita canadensis (Provancher) ASHMEAD, Can. Ent., vol. 19, 1887, p. 126.—CRESSON, Syn. N. Amer. Hym., 1887, p. 249.

Isocybus canadensis (Provancher) ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 329.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Survey, 1916 (1917), p. 541.

Isocybus nigriclavus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 328.

Isocybus pallipes (Say) ASHMEAD, Can. Ent., vol. 19, 1887, p. 132.—CRESSON, Syn. N. Amer. Hym., 1886, p. 250.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 328. (Misidentification of Say's species, see p. 109.)

Isocybus pallipes (Say) BRUES, Bull. 22, Conn. Geol. Nat. Hist. Survey, 1916 (1917), p. 541.

Female.—Length 4 mm. Head two-thirds as wide as long, as wide as the thorax, very full behind the eyes, the cheeks being highly convex and much wider than the eyes; occiput and vertex shagreened, the former emarginated, sometimes punctate rugose; frons rugose, finely set with twisted raised lines, reticulated; cheeks sometimes with a sculpture similar to that found on the frons, frequently shagreened, without raised lines; antennal projection depressed down the middle, notched anteriorly; scape slender, long and curved, extending above the dorsal surface of the head; pedicel as long as joint four, shorter and wider than three which is three times as long as wide at apex; joints five to nine wider than four, a little longer than wide, cylindrical; ten as long as three, subacute apically, the upper side curved near the apex; thorax nearly twice as long as wide, more or less flattened above, higher than wide; pronotum roughened and strongly punctate above on the sides; mesonotum usually mostly polished, sometimes mostly sculptured like the frons; notauli deep, complete; lateral lobes coarsely shagreened along their inner margin; posterior margin of mesonotum with long hairs projecting over the scutellar fovea; scutellum transverse, roughened, with a large central space densely covered with short whitish hairs, lateral margins of scutellum very high and sharp, projecting above the surface of the scutellum; propodeum rather finely roughened, densely covered with erect long white hair; median carinae close together and parallel; first tergite as wide as long, slightly narrowed anteriorly, roughened and covered with erect white hair on each side of the median area; median area well defined, widened flask-like anteriorly, much longer than wide; abdomen obovate, a little over twice as long as wide, wider than the thorax, as long as the head and thorax united; second tergite two-thirds as wide as long, three-eighths as wide at base as at apex, without sculpture of any sort; basal foveae deep, not especially large, as long as the first tergite, pubescent; tergites three to six finely shagreened, united three-tenths as long as the second, the third a little the longest; wings brownish, extending half the length of the second tergite past the apex of the abdomen. Black; antenna and legs (except last six joints of the former and the coxae) brownish yellow, shining; antennal club brown, coxae black.

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[4] Cat. Hym., vol. 5, 1898, p. 469.

[5] Hym. Affin. Monogr., vol. 2, 1834, p. 300.

[6] Bull. 45, U. S. Nat. Mus., 1893, pp. 327-33

Male.—Length 3 mm. Pedicel one and one-half times as long as wide; as long and as wide as joints three and four; joint three elongate and more or less triangular; four cylindrical, slightly widened below at apex; five cylindrical, a little longer than wide, as wide as four at apex; joints six to nine as wide as four, becoming gradually longer distally; ten very long and acute apically, nearly as long as eight and nine united, three times as long as wide; abdomen sculptured as in the female, spatulate, a little over twice as long as wide, as long as the head and thorax united; tergites three to seven finely shagreened, thickly pubescent, united one-third as long as the second; wings extending the length of the second tergite past the apex of the abdomen. Coloration as in the female; flagellum, including the pedicel, usually brownish, sometimes yellow.

Type locality.—Ottawa, Canada.

Other localities.—Greeley, Colorado; Algona, Iowa; Texas; Michigan.

Type.—One of Provancher's male paratypes is in the National Museum (Cat. No. 25427). The types of *I. nigriclavus* are also in the National Collection (Cat. No. 2306).

Besides the types mentioned above the National Collection has a number of specimens from the Agricultural College in Michigan. Several of these specimens are recorded as having been reared March 10, 1887, from a gall on willow. The others bear only the labels, "June 3, 1887," and "Ag. Coll. Mich."

VI. Genus TRICHACIS Foerster.

Trichacis FOERSTER, Hym. Stud., Heft. 2, 1856, p. 115. Three species. *Genotype.*—*Platygaster pisis* Walker. (By original designation.)

This is a genus occupying a position very similar to that formerly held by *Polygnotus*. In other words it is separated from an allied genus, *Isocybus*, by characters which are relative and therefore impossible to define exactly. It is too much to expect that the head in the one group should always remain distinctly transverse and in the other cubical. It is certain that species exist which serve to unite the two. Indeed we have in *Trichacis rufipes* a form which has the head distinctly less than twice as wide as long, a condition approaching that found in *Isocybus*.

Probably the best way to fix the position of *Trichacis* in mind would be to remember that it has all the peculiarities of *Platygaster* except the smooth scutellum with its scanty covering of hairs.

Ashmead, in his monograph of the North American Proctotrypidae, referred two species belonging to *Trichacis* to the genera *Isorhombus* and *Synopeas*. The species, *Isorhombus arizonensis* Ashmead and *Synopeas cornicola* Ashmead are redescribed below and should be readily recognized if the description is properly used.

TABLE TO SPECIES.

1. Head less than twice as wide as long...................... 1. **rufipes** Ashmead.
Head two or more times wider than long.................................. 2.
2. Occiput strongly transversely striate.................... 2. **rubicola** Ashmead.
Occiput not or very finely striate... 3.
3. Scutellum very high, conical seen from the side, without a distinct tuft of hair at summit..................................... 3. **arizonensis** (Ashmead).
Scutellum low, not conical, with a distinct tuft of hair at summit........... 4.
4. Abdomen in female less than twice as long as wide...... 4. **cornicola** (Ashmead).
Abdomen in female twice as long as wide............ 5. **virginiensis** Ashmead.

1. TRICHACIS RUFIPES Ashmead.

Trichacis rufipes ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 295.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Survey, 1916 (1917), p. 534.

Female.—Length 2.20 mm. Head three-fifths as wide as long, not emarginate posteriorly, wider than the thorax; occiput polished, separated from the vertex by a low but sharp carina; cheeks shagreened; interocellar space polished, shagreened laterally; frons polished, narrowly shagreened laterally, with a few striae above the antennae; pedicel twice as long as wide, as long and as wide as joint three, a little longer and narrower than four; five triangular, as long as four, as long as six but somewhat narrower; six as wide as long, narrowed basally, a little longer than seven; seven to nine a little wider than long; ten less than twice as long as wide, a little longer than the pedicel, subacute apically; thorax four-sevenths times as wide as long, higher than wide; pronotum pubescent, polished; mesonotum finely shagreened on anterior half, polished otherwise; notauli nearly parallel, deep and wide posteriorly, not quite reaching the pronotum; median lobe broadly truncate posteriorly; scutellum elevated into a transverse ridge, sharply and highly margined laterally, with a tuft of short white hairs on its posterior face, covered all over with long white hairs; petiole a little wider than long, fluted, the median area longer than wide, with a central carina; abdomen elliptical, a little over twice as long as wide, distinctly longer than the head and thorax united; second tergite as wide as long, without striations basally, narrowed anteriorly, the sides straight; foveae deep but not especially large; tergites three to six finely shagreened, about equally long, united four-fifths as long as the second; six a little wider than long, rounded apically, with scattered pubescence; wings slightly tinged with brown, scarcely reaching beyond the apex of the abdomen. Black; legs and scape yellow; the hind coxae and joints two to five of the antenna touched with brown; club-joints fuscous.

Male.—Length 2.20 mm. Pedicel less than twice as long as wide, as wide as joints three and four, a little longer than three; four cylindrical, as long as two and three united; joints five to nine a little longer than wide; ten conical, acute at apex, longer than four; abdomen wider than the thorax, a little over twice as long as wide, rounded apically, longer than the head and thorax united; segments three to seven finely shagreened, about equal in length, the last shorter, rounded apically; three to seven united a little over half as long as the second. Flagellum, including the pedicel, light brown in color.

Type locality.—Arlington, Virginia.

Allotype locality.—Washington, District of Columbia.

Other localites.—Jacksonville, Flordia, and St. Louis, Missouri.

Type.—Cat. No. 2277. U.S.N.M. Female from Arlington, Virginia, selected as type and male from Washington as allotype. Other specimens considered paratypes.

Redescribed from the type series, three females and one male, in the National Museum at Washington. The Missouri specimen was reared from acorns infested with *Balaninus nasicus* and *Blastobasis glandulella*.

2. TRICHACIS RUBICOLA Ashmead.

Trichacis rubicola ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 296.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Sur., 1916 (1917), p. 534.

Trichacis arizonensis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 296. (Not *Isorhombus arizonensis* Ashmead, p. 277.)

Trichacis brunneipes ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 296.

Female.—Length 1.60 mm. Head twice as wide as long, as wide as the thorax, narrow behind the eyes; occiput strongly and regularly transversely striate, separated from the vertex by a sharp carina;

cheeks flattened, striate; frons finely aciculate, with a few striae above the antennae; pedicel less than twice as long as wide, as wide as joint five, wider than three, as long as three and four united; four as long and as wide as three, about as long as wide; five twice as long as wide, as long as the three preceding joints united, as wide as six; six not quite as long as five; seven to ten subequal in length and width, longer than wide; ten subacute apically, the sides rounded; thorax less than twice as long as wide, flattened above, higher than wide; pronotum unsculptured, sparsely pubescent; mesonotum faintly shagreened anteriorly, polished otherwise; notauli complete, faintly indicated anteriorly; median lobe broadly rounded posteriorly, touching the scutellum; propodeum sparsely pubescent laterally; abdomen apparently only four jointed, elliptical, the length of the head longer than the head and thorax united, as wide as the thorax, two and one-third times as long as wide; first tergrite twice as wide as long, polished, not striate, the median area longer than wide; second tergite unsculptured, a little longer than wide; slightly narrowed anteriorly, the sides nearly straight; basal foveae very short, unsculptured; third tergite unsculptured, three times as wide as long, traversed medially by an irregular double row of punctures, from each of which projects a short white hair; fourth tergite two-thirds as wide at base as long, triangular, rounded posteriorly; this segment is transversely elevated on basal two-fifths; in front of the elevation the segment is longitudinally striated, behind it is flattened, polished, and unsculptured; tergites three and four united as long as the second; wings hyaline, reaching slightly beyond the apex of the abdomen. Shining black; flagellum, middle and posterior femora and tibiae, dark brown; scape, pedicel, and rest of legs, yellow.

Male.—Length 1.5 mm. Pedicel a little longer than wide, as wide as joint five, as long as joints three and four united; three triangular, as wide as long, longer than four from points of attachment, narrower than the pedicel; four produced tongue-shaped on the lower side of five, one-third as long as five from tip to tip, very short seen from above; five three times as long as wide, longer than the three preceding joints united; emarginate below at base where joint four is closely attached; joints six to seven twice as long as wide; eight and nine less than twice as long as wide; ten as long as seven, subacute apically; abdomen elliptical, a little longer than the head and thorax united, twice as long as wide; tergites three to seven unsculptured, united two-thirds as long as the second; wings hyaline, extending nearly the length of the last five segments past the apex of the abdomen. Antennae brownish, the scape and pedicel somewhat lighter in color.

Type locality.—Cadet, Missouri.

Allotype locality.—Washington, District of Columbia.

Other localities.—Jacksonville, Florida; Mount Graham, Arizona.

Type.—Cat. No. 2278, U.S.N.M. Female from Cadet, Missouri, selected as type; male of *rubicola* from Washington, District of Columbia, as allotype; others considered paratypes.

Redescribed from the type series, five females and one male, in the National Museum at Washington. Two females were reared by C. V. Riley, June 16, 1883, from a Cecidomyid stem-gall on blackberry at Cadet, Missouri. The others were reared June 9, 1886, from Cecidomyid gall on *Vernonia noveboracensis*, collected at Washington.

I have compared the types of *arizonensis* (Cat. No. 2279, U.S.N.M.) and *brunneipes* (Cat. No. 25428, U.S.N.M.) with the specimens refered to above and can find no specific differences. The type series of *arizonensis* consists of three females and one male, reared by Dr. H. K. Morrison, at Mount Graham, Arizona, from a Cecidomyid gall on wild sunflower. The type of *brunneipes* was not reared. It was collected at Jacksonville, Florida.

This species is a most remarkable one. The structure of the abdomen in the female and of the antenna in the male has no parallel among described Platygasterids. I might create a new genus for it but it is possible to include it in *Trichacis* and I prefer to let it remain there.

3. TRICHACIS ARIZONENSIS (Ashmead).

Isorhombus arizonensis Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 277. (Not *Trichacis arizonensis* Ashmead, 1893, p. 296.)

Female.—Length 1.80 mm. Head more than than twice as wide as long, wider than the thorax, flattened in front, slightly emarginate behind; occiput and vertex rounded, polished, pubescent except in the middle; entire face polished, without sculpture; pedicel twice as long as wide, as long as joint ten, as wide as five, a little longer than three; joint three twice as long as wide, as long or nearly as the pedicel, longer than four; four a little longer than wide, as long but slightly narrower than five, as wide as three; six to nine a little longer than wide, as wide as the scape in the middle; thorax two-thirds as wide as long, strongly convex above, a little higher than wide; pronotum mostly polished, pubescent, partly shagreened laterally; mesopleural furrow deep and wide; mesonotum finely shagreened anteriorly, behind with long hairs reaching over the scutellar foveae; notauli attaining anterior third of mesonotum; median lobe broadly truncate apically, not touching the scutellum; scutellum circular seen from above, conically produced and bidentate at the summit when viewed from the side, perpendicular behind, slightly sloping in front, thickly covered with long, evenly distributed white hairs; abdomen broadly elliptical, as wide as the head, two-thirds as wide as long, as long as the head and thorax united; first tergite twice as wide as long, thickly pubescent laterally, with the median area longer than wide; second tergite as wide as long, smooth, the foveae unsculptured, pubescent basally, tergites three to six very finely shagreened or covered with wavy reticulations, united a little over half as long as the second, the last four segments becoming gradually shorter toward the apex; sixth tergite as long as the fifth, much wider than long; wings slightly infuscated, reaching a little beyond the apex of the abdomen. Black; legs bright brownish-yellow; antennae and coxae dark brown.

Type locality.—Fort Huachuca, Arizona.

Type.—Cat. No. 2270, U.S.N.M.

Redescribed from the type specimen in the United States National Museum. The type was reared May 8, 1883, from a Cecidomyid gall on an unknown plant, sent to the Department of Agriculture by H. K. Morrison.

4. TRICHACIS CORNICOLA (Ashmead).

Synopeas cornicola ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 288.

Female.—Length 1.20 mm. Head more than twice as wide as long, emarginate behind, wider than the thorax; occiput aciculate, separated from the vertex by a carina; cheeks shagreened, convex; length of head above eyes greater than its length below them; frons polished, wider than the greatest diameter of the eyes; pedicel and the four joints following it subequal in width, the pedicel the longest, twice as long as wide; joint three longer than wide, shorter than four, which is one and one-half times as long as wide; five shorter than three, hardly longer than wide; six as long as four; joints seven to nine wider than long; ten as long as two, conical, blunt apically; thorax three-fourths as wide as long, convex above, higher than wide; pronotum mostly smooth and shining, narrowly shagreened medially on the sides; mesonotum finely shagreened anteriorly, along its posterior margin densely covered with long golden hairs which extend over the scutellar fovea; notauli distinct on basal two-thirds of mesonotum; median lobe broadly truncate posteriorly; scutellum flattened above and with the dorsal face sharply distinguished from the posterior; on the transverse ridge is a small, dense tuft of white hairs; scutellum highly margined laterally, sparsely covered with long golden hairs; abdomen broadly elliptical, as long as the head and thorax united, as wide as the head, two-thirds as wide as long; first tergite evenly rounded above, the median area not very distinctly indicated, longer than wide; second tergite a little longer than wide, not sculptured; foveae short and deep, pubescent basally; tergites three to six shining, with an indistinct sculpture, subequal in length, united not quite one-half as long as the second; six a little longer than the rest, broadly transverse; wings slightly infuscated, extending half the length of the second tergite past the apex of the abdomen. Black; legs and antennae brown, the flagellum, middle and posterior femora, and tibiae, darker.

Male.—Length 1.20 mm. Pedicel longer than wide, as wide as joint three, a little shorter than four; joint three closely united to four, transverse, not quite as wide as four; four somewhat longer than wide, obliquely excised distally; six to nine a little longer than wide; ten as wide as two, as long as three and four united; abdomen as wide as the head, two-thirds as wide as long, a little longer than the thorax; wings extending two-thirds the length of the second tergite past the apex of the abdomen.

Type locality.—Kirkwood, Missouri.

Type.— Cat. No. 2273, U.S.N.M. Type and allotype selected.

Redescribed from the type series, nine females and two males, in the National Museum. They were reared by Miss Mary Murtfeldt April 3, 1887, from a Cecidomyid gall on *Cornus paniculata.*

5. TRICHACIS VIRGINIENSIS Ashmead.

Trichacis virginiensis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 297.

Female.—Length 1 mm. Head more than twice as wide as long, wider than the thorax, not emarginate behind; occiput smooth, shining, separated from the vertex by a sharp carina; cheeks subconvex, unsculptured; vertex shagreened laterally; frons smooth and shining; length of head above eyes not greater than length below; pedicel twice as long as wide, longer and wider than joint three; three as long and as wide as four; five narrower, as wide as long, equal to six; seven to nine broadly transverse; ten as wide as nine, less than twice as long as wide, blunt apically; thorax three-fourths as wide as long, as wide as high, somewhat flattened above; otherwise entire thorax as in *cornicola* but the scutellum without such distinct dorsal and posterior faces; abdomen elliptical, twice as long as wide, distinctly longer than the head and thorax united; second tergite as wide as long, not sculptured and with short basal foveae not so distinctly pubescent as in *cornicola;* tergites three to six united nearly as long as the second; four and five equally long, a little longer than three, like the third very finely punctate; six as long as three and four united, polished, triangular, as long as wide, sharply pointed distally; wings brown, reaching a little beyond the apex of the abdomen. Black; antenna, except club, tibiae and tarsi (except last joint of each) and trochanters, yellow; club and parts of legs not mentioned brownish or piceous.

Type locality.—Arlington, Virginia.

Type.—Cat. No. 25429, U.S.N.M.

Redescribed from the type specimen.

VII. Genus ERITRISSOMERUS Ashmead.

Eritrissomerus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 298. Monobasic.
Genotype.—Eritrissomerus cecidomyiae Ashmead.

This genus differs from *Platygaster* Latreille only in having the process between the antennae acute at apex, not truncate or emarginate. If one is unable to see this projection he can not place his specimen in the correct genus. Ashmead considered the extraordinary structure of the male antennae peculiar to this genus, but I have specimens in my collection which have the antenna precisely as in *Eritrissomerus cecidomyiae*, the type of the genus and which have the process between the antennae truncated at apex. I consider this genus an artificial one and used it merely for convenience. It should, I believe, be included in the genus *Platygaster* but there is no objection to keeping it separate for the present.

There are five species now included in *Eritrissomerus*. All are from eastern North America, the specific localities being Jacksonville, Florida; Hull, Canada; Albany, New York; and Cabin John, Maryland. My new species *parvus* was found at Cabin John.

The habits of two of the species are known, or rather partially known. *E. cecidomyiae* is parasitic on a *Cecidomyid* infesting hickory and *E. noveboracensis* is recorded as having been reared from a Cecidomyid gall.

The following table serves to distinguish all the species included in the genus, there being no exotic forms described.

TABLE TO SPECIES.

1. Body rufo-piceous; antennae, except club, yellow...... 1. **pallipes** Harrington
Body black.. 2.
2. Vertex rugose, with large transversely directed carinae.
2. **cecidomyiae** Ashmead.
Vertex aciculate or shagreened.. 3.
3. Vertex transversely aciculate; legs yellow, rarely somewhat infuscated.
3. **noveboracensis** Brues.
Vertex shagreened; front legs golden yellow; middle and posterior legs infuscated in part.. 4.
4. Abdomen longer than the thorax...................... 4. **parvus**, new species.
Abdomen as long as the thorax...................... 5. **floridanus** Ashmead.

1. ERITRISSOMERUS PALLIPES Harrington.

Eritrissomerus pallipes HARRINGTON, Trans. Royal Soc., Canada, vol. 5, 1900, p. 191.

The best I can do is to reproduce the original description which I do merely for the sake of completeness. I can not hope that the species will be recognized by it, but it is well to have the description more accessible. Harrington does not say whether the antennal process is acute or not, but it is reasonable to suppose that it was since that character is the only one really peculiar to the genus

The original description follows:

♀.—Length 1.2–1.5 mm. Rufo-piceous, legs yellowish. Head broad, darker than the thorax, microscopically punctate or shagreen; lateral ocelli as far from the eyes as from the central one; antennae yellow, the club dusky, the pedicel as long as the first two joints of flagellum, club joints subquadrate. Thorax and abdomen rufo-piceous, petiole paler; metathorax and petiole pubescent.

♂.—Closely resemble ♀ in size and coloration. Antennae paler; pedicel small, first joint of flagellum minute, closely joined to the swollen second joint, the two together almost egg-shaped, first joint of club small, subtriangular, the following joints quadrate, subpedicellate, terminal joint larger, acuminate.

Described from several female and male specimens obtained near Hull in August.

2. ERITRISSOMERUS CECIDOMYIAE Ashmead.

Eritrissomerus cecidomyiae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 299, pl. 13, fig. 1. females.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Survey, 1916 (1917), p. 534.

Female.—Length 2 mm. Head slightly over twice as wide as long, flattened in front and behind, a little wider than the thorax; occiput roughened, with many longitudinal wavy carinae; cheeks subconvex, rugose; very strongly shagreened; vertex rugose, with many irregular transversely directed carinae; middle of frons with a longitudinal furrow, into which converge numerous large, curving striae; interocellar area present as a line, carinate, the anterior ocellus intercepting a line connecting the lateral ocelli; lower part of face with straight transverse carinae; malar space polished, unsculptured; antennae rather stout; pedicel twice as long as wide, as wide as joint four and as long as joints three and four united; three longer than wide, narrower than four and closely jointed to it, about as long as four; five and six a little longer than wide, shorter than four; five narrower than four or six which are equally wide; seven to nine broadly transverse, shorter and wider than six; ten as long as four, blunted apically, as wide as nine; thorax three-fourths as wide as long, egg-shaped, strongly convex above, a little higher than wide, strongly shagreened except on the pleural and sternal plates; notauli complete; median lobe pointed posteriorly; scutullum transverse, convex, strongly shagreened, margined laterally, without pubescence; abdomen broadly elliptical, sharply pointed apically, as wide as the thorax, two-thirds as wide as long; first tergite short and wide, the median area wider than long, well defined laterally; second tergite a little longer than wide, twice as wide apically as basally, strongly and regularly striate on basal half, the foveae sparsely pubescent; tergites three to six unsculptured, united one-third as long as the second; six triangular, broadly transverse, sharply pointed apically; wings hyaline, extending slightly beyond the apex of the abdomen. Black; joints three to five of antenna, most of anterior femora, anterior tibiae, other tibiae basally and all tarsi, of the color of gold; rest of appendages shining black or infuscated.

Male.—Length 2 mm. Pedicel a little longer than wide, widened apically, with a tuft of long hairs below at apex, wider than any flagellar joint except the third and fourth: three triangular, transverse, closely joined to the fourth, as wide as two; four a little wider than long, twice as wide as the pedicel, slightly narrowed distally; five to seven a little longer than wide; eight and nine quadrate; ten as long as four, conical, sharply pointed apically; joints six to ten equally wide, a little wider than five; abdomen five-eighths times as wide as long, as long as the thorax; tergites three to seven polished, united less than one-third as long as the second; seven broadly rounded apically; wings hyaline, extending half the length of the second tergite past the apex of the abdomen.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 2280, U.S.N.M.

Redescribed from the type series, one female (selected as type) and two males (one selected as allotype). According to Ashmead these specimens were reared from a Cecidomyid gall on hickory. Two of the types bear no label whatsoever and the other is labeled only, "Jacksonville, Florida." Three other specimens included by Ashmead in the type series do not belong to the same species. They remain undescribed.

3. ERITRISSOMERUS NOVEBORACENSIS Brues.

Eritrissomerus noveboracensis BRUES, Bull. Wisc. Nat. Hist. Soc., vol. 8, 1910, p. 48.

The original description is as follows;

> ***Male.***—Length 2 mm. Black; legs yellow, sometimes infuscated on the hind femora; antenna piceous brown, scape lighter brown. Head slightly wider than the thorax, very much contracted behind the eyes; about twice as wide as thick. Vertex and occiput finely transversely aciculated. Lateral ocelli more than their diameter removed from the eye margin, about as close as to the median ocellus. Front punctate or slightly transversely aciculate, with a smooth, median slightly inpressed line below the anterior ocellus. Face transversely striate. Cheeks sparsely punctate. Madibles ferruginous. Antennae 10-jointed; scape reaching to the median ocellus; pedicel obovate, twice as long as the first flagellar joint which is half as long and only about one-third as wide as the greatly swollen second joint; two following joints narrow, each about one-half longer than wide; following growing shorter except the last which is longer, narrower, and acuminate. Mesonotum elongate, with two very distinct, complete parapsidal furrows which are closely approximated; its surface shining, faintly punctulate. Scutellum very convex, rounded, with a very distinct carinate margin. Pleurae smooth, shining; the mesopleura with a large impression below and with a few coarse striae just beneath the tegulae. Collar below on the sides closely punctulate. Metapleura thinly hairy, not striated, with a short basal carina above, which forms a triangular area with a second oblique carina lower down on the metapleura. Abdomen elongate, pointed, about one-third longer than the head and thorax united. Petiole and basal third of second segment finely striated, the striae on the sides of the second segment shorter; second segment nearly as long as the following united. Legs bright or honey-yellow; coxae black and the four posterior tibiae sometimes infuscated. Wings hyaline with a slight yellowish tinge.

> Described from two specimens (a1360) bred by Dr. E. P. Felt at Albany, New York, April 5, 1907, from a Cecidomyid gall. A third specimen (a1339) was reared May 7, 1907.
>
> The species looks very much like certain species of *Polygnotus*, but the peculiar swollen condition of the second flagellar joint, characteristic of males of the present genus will readily serve to distinguish it from that very extensive genus.

Professor Brues does not say anything about the location of the types, but in all probability they are deposited in the museum at Albany, New York.

4. ERITRISSOMERUS PARVUS, new species.

Female.—Length 1 mm. Head twice as wide as long, slightly emarginate behind, a little wider than the thorax; cheeks subconvex, shagreened; occiput and vertex shagreened, the latter with some inconspicuous striae medially; frons polished, faintly aciculate laterally and below; antennal process sharp, without a median carina; pedicel as wide as joint four, wider than three, not quite as long as three and four united, twice as wide as long; three nearly as long as four; four very little longer than wide, longer than five and six which are slightly transverse, wider; seven to nine rather broadly transverse, as in *cecidomyiae*; joint ten a little longer than four, acute apically, the sides straight; thorax three-fourths as wide as long, strongly convex above, as wide as high; pronotum partly shagreened laterally; mesonotum finely shagreened; notauli complete, meeting in a point posteriorly, the median lobe polished near its apex; scutellum as in *cecidomyiae;* abdomen spatulate, a little wider than the thorax, as long as the head and thorax united, two-thirds as wide as long; first tergite pubescent on the sides; median area quadrate, with several inconspicuous carinae; second tergite as wide as long, twice as wide apically as basally, the sides not much curved; basal foveae closely striate, the striae attaining the middle of the segment; interfoveal area closely striate; tergites three to six polished, united one-third as long as the second; wings hyaline, extending a little more than the length of the last four segments united past the apex of the abdomen. Black; antenna (except last six joints), anterior legs, trochanters, tibiae basally and all tarsi, honey-yellow; rest of legs and antennae piceous.

Type locality.—Cabin John, Maryland.

Type.—Cat. No. 25430, U.S.N.M. Paratype in Collection Fouts.

Described from two females collected by the author, June 3, 1917, on the leaves of hickory.

5. ERITRISSOMERUS FLORIDANUS (Ashmead).

Polygnotus floridanus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 318.

Female.—Length 1.20 mm. Very closely related to *parvus* Fouts, but with the following differences: Frons slightly more distinctly aciculate laterally and below; abdomen about as long as the thorax; appendages generally lighter colored, the femora and tibiae not so strongly darkened, brownish.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25431, U.S.N.M.

Redescribed from the type specimen. It is mounted on a card point and is in perfect condition.

VIII. Genus PLATYGASTER Latreille.

Platygaster LATREILLE, Gen. Crust. et Ins., vol. 4, 1809, p. 31. (Monobasic.)
Genotype.—*Platygaster ruficornis* Latreille (by original designation).
Polygnotus FOERSTER, Hym. Stud., Heft 2, 1856, pp. 108, 115. (Monobasic.)
Genotype.—*Platygaster striolatus* Nees (by original designation).
Hypocampsis FOERSTER, Hym. Stud., Heft 2, 1856, pp. 108, 115. No species originally included.
Aneuron BRUES, Bull. Wisc. Nat. Hist. Soc., vol. 8, 1910, p. 49. (Monobasic.)
Genotype.—*Aneuron anormis* Brues (by original designation).
Xestonotidea GAHAN, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 524. (Monobasic).
Genotype.—*Xestonotidea foersteri* Gahan (by original designation).

This genus was rather briefly treated in a former paper by the author. It was shown to be identical with *Polygnotus* Foerster and with several other Foersterian genera as interpreted by Ashmead in his Monograph.[7] I have found that the genus *Aneuron* Brues[8] is also a synonym of *Platygaster*. For awhile I considered it distinct, not having seen any such peculiar antennal structure in the great quantity of material at my disposal. However, *Platygaster floridensis* Ashmead and *caryae* Ashmead agree with Brues' description of *Aneuron* except that the female of each species has the third antennal joint, though elongate, distinctly shorter than either the second or the fourth. The structure of the male antenna in these species, though peculiar, is not very far removed from the *Platygaster* type. It is merely a question of degree, and such differences, unless of considerable magnitude can not be used to separate genera. *P. floridensis* has the lower tooth of the mandibles a little longer than the upper; *caryae* has the teeth equal or approximately so, as in most species of *Platygaster*. I can not compare *Aneuron anormis* Brues with other species in terms of mandibular structure since Professor Brues neglected to say anything about such parts in his description.

The distinguishing feature of *Hypocampsis* Foerster seems to be the broad flat abdomen with its wide lateral ventral margins. This peculiarity I do not consider generic. My new species *shastensis* and *lucida* agree in every respect with Foerster's original description of *Hypocampsis*. *Shastensis* was, like Foerster's specimens, reared from the cones of *Abies*, and *lucida* was reared from the cones of a related evergreen tree, *Picea englemanni*. Thomson's species *hyalinata, compressicornus*, and *angustula*,[9] seem to belong to the genus *Platygaster* but is hard to say definitely since some species of *Leptacis* are without a spine on the scutellum. The character of real importance, namely, the presence or absence of foveae on the second tergite, is not discussed at all in Thomson's descriptions.

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[7] Proc. Wash. Ent. Soc., vol. 22, p. 69 (1920).

[8] Described in Bull. Wisc. Nat. Hist. Soc., vol. 8, 1910, p. 49.

Xestonotidea Gahan[10] with *foersteri* Gahan as its type, is a typical *Platygaster* species. Foerster would probably have placed it in his genus *Polygnotus*, although the sculpture is delicate. The median lobe of the mesonotum is truncated and touching the scutellum, but the lateral lobes do not touch the upper part of the scutellum, a wide space being left between the two parts. The scutellum is not quite typical of *Xestonotus* Foerster being rather densely pubescent laterally.

This mistake in identification is of no moment, however, for I have specimens showing transition between the wide scutellar suture of *Platygaster* and the narrow one of *Xestonotus* Foerster. As with *Aneuron*, discussed above, the difference is one of degree and is of little or no generic value. *Anopedias error* Fitch may be taken as showing the typical form of *Xestonotus*, with its narrow scutellar suture and parallel, widely separated notauli.

Isorhombus hyalinipennis Ashmead, which seems to form the basis of Ashmead's conception of the genus *Isorhombus*, really belongs to *Platygaster* and forms a division of its own characterized by a sharp differentiation in the color of the funicle and club. Ashmead was in error when he said the antennal clubs of the types were three-jointed. They are really four-jointed (with the first joint only slightly wider than the last funiclar joint) although a three-jointed appearance is caused by the differentiation in color of terminal three joints. Other points of interest in connection with the types are: First, the lateral ocelli are less than their diameter distant from the margin of the eye; and, second, the scutellum has the dorsal plate slightly upturned apically. The sculpture of the specimens as a whole is moderately fine, the scutellum and the greater part of the body being faintly shagreened.

The subgenus *Triplatygaster* Kieffer[11] with *contorticornis* Ratzeburg as its type, has not been recognized in America. The group is characterized by having the mesonotum very long and indistinctly longitudinally striate, the notauli complete, and the eyes pubescent.

This synonony necessitates a restatement of the generic diagnosis given in my paper referred to above:

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[9] Öfvers. af K. Vet.-Akad. Förh., 1859, p. 82.

[10] Proc. U. S. Nat. Mus., vol. 56. p. 524

[11] Broteria: Serie Zoologica, vol. 11, fasc. 3, 1913, p. 178.

Head broadly transverse to subquadrate; face with a truncate or emarginate projection between the antennae; lateral ocelli close to or remote from the eye margin; mandible bidentate, the teeth equal or unequal; antennae in female 10-jointed, clavate, gradually increasing in thickness toward the tip; antennae in male 10-jointed, filiform, with the fourth joint deformed in some way, usually emarginate below at the base, sometimes widened in the middle with a sharp edge below; thorax short to moderately elongate, the notauli either absent, incomplete, or complete: if complete they may be parallel and widely separated at the base, or converging posteriorly; mesonotum with a wide or narrow suture separating it from the scutellum; scutellum flat or convex, margined laterally, sparsely pubescent or without hair, unarmed or with a short tubercle on its posterior dorsal surface; this tubercle consisting of the upturned edge of the dorsal plate of the scutellum; propodeum short, with two parallel, median, longitudinal, elevated carinae; tarsi 5-jointed; wings, pubescent, ciliate at the margins, veinless; abdomen in female as short as the thorax to several times as long as the head and thorax united, depressed; abdomen in male usually about as long as the thorax; first and second tergites sometimes sparsely pubescent, the former laterally, the latter basally; second tergite in both sexes with two more or less distinct basal foveae, their position indicated by an emargination at the anterior border of the segment.

TABLE TO SPECIES.

1. Scutellum granular or shagreened .... 2.
   Scutellum polished on its dorsal surface, unsculptured .... 26.
2. Occiput smooth, not distinctly sculptured .... 3.
   Occiput striate .... 4.
   Occiput granulose or shagreened .... 14.
3. Mesonotum shagreened; notauli complete, nearly parallel; foveal striations on second tergite extending slightly beyond the apex of the depression; legs fuscous; wings perfectly hyaline, the marginal fringe distinct; abdomen considerably longer than, and one and one-half times as wide as, the thorax, ovate, rounded apically. Head of type male lost............ 1. **aphidis** Ashmead.
4. Face just above insertion of antennae faintly transversely striate........... 5.
   Face just above insertion of antennae strongly transversaly striate.......... 6
5. Notauli complete, well indicated..................... 2. **americana** (Ashmead).
   Notauli not indicated anteriorly.................... 3. **floridensis** Ashmead.
6. Head narrower than the thorax; frons strongly elevated across the middle and with a broad and deep longitudinal furrow reaching from the anterior ocellus to the striations below......................... 4. **obscuripennis** Ashmead.
   Head never narrower than the thorax.............................. 7.
7. Face just below anterior ocellus strongly granular with faint striae, the area just below this coarsely transversely striate........... 5. **melliscapa** (Ashmead).
   Face just below anterior ocellus not granular, either striate or shagreened; area below this less coarsely striate.............................. 8.
8. Upper part of face on sides shagreened.............................. 9.
   Upper part of face on sides striate.............................. 11.

9. Notauli complete.................................. 6. **laevicollis** (Ashmead).
Notauli incomplete.................................. 10.
10. Occiput with regular carinae, not rugose.............. 7. **rufipes** (Ashmead).
Occiput rugose, without regular carinae.................. 8 **caryae** Ashmead.
11. Foveal striae on second tergite not extending beyond the depression posteriorly.................................. 12.
Foveal striae extending beyond the depression posteriorly.................. 13.
12. Wings infuscated; frons rather finely and evenly striate all over.
9. **fuscipennis**, new species.
Wings hyaline; frons coarsely striate on lower half, more finely so above with the striae interrupted medially.................. 10. **striaticollis** (Ashmead).
13. Aciculations on sides and upper part of frons very fine and undulating; last abdominal segment in female shorter than the one preceding.
11. **canadensis** (Ashmead).
Sides and upper part of frons with distinct, not wavy, striae; last abdominal segment in female longer than the one preceding.... 12. **picipes** (Ashmead).
14. Frons opaque, very faintly shagreened......... 13. **vancouverensis** (Ashmead).
Frons more or less shining, polished, striate or more strongly shagreened.... 15.
15. Foveae on second tergite not or very indistinctly striate or aciculate........ 16.
Foveae on second tergite distinctly striate, at least near their apices....... 20.
16. Abdomen in female much longer than the head and thorax united......... 17.
Abdomen in female not longer than the head and thorax united; legs and antennae dark brown.................................. 18.
17. Antennae and legs bright yellow or golden colored...... 14. **confusa**, new name.
Antennae piceous or of a dark brown color; legs never entirely yellow, mostly brownish.................................. 15. **nigrifemur** (Ashmead).
18. Seventh and eighth antennal joints in male distinctly longer than wide..... 19.
Seventh and eight antennal joints about as wide as long; abdomen in male nearly two-thirds as wide as long.................................. 16. **herrickii** Packard.
19. Frons polished, unsculptured; abdomen in male hardly over half as wide as long.................................. 17. **lampronota**, new species.
Frons shagreened.................................. 18. **websteri**, new species.
20. Females.................................. 21.
Males.................................. 25.
21. Last three joints of the antennae black, the others golden-yellow; abdomen not longer than the head and thorax united......... 19. **hyalinipennis** (Ashmead).
Antennae more uniform in color, the last three joints not so sharply differentiated; abdomen longer than the head and thorax united.................................. 22.
22. Antennal joints six and seven less than twice as long as wide.
20. **alnicola** (Ashmead).
Antennal joints six and seven two or more times as long as wide........... 23.
23. Abdomen extending beyond the apex of the wings when the latter are laid flat upon it.................................. 21. **shastensis**, new species.
Abdomen not extending beyond the apex of the wings.................................. 24.
24. Ninth antennal joint about three times as long as wide; antennae not so slender; abdomen failing to reach the tips of the wings when the latter are laid flat upon it.................................. 22. **lucida**, new species.
Ninth antennal joint about four times as long as wide; antennae filiform, extremely slender; abdomen just attaining the tips of the wings.
23. **gahani**, new species.
25. Second tergite very strongly striate basally.......... 20. **alnicola**, (Ashmead).
Second tergite less strongly striate basally........ 24. **melanocera** (Ashmead).

26. Notauli complete .... 27.
Notauli absent .... 25. **diplosidis** (Ashmead).
Notauli partially complete .... 33.

27. Mesonotum separated from the scutellum by a narrow incision; notauli parallel or nearly so .... 26. **error** Fitch.
Mesonotum separated from the scutellum by a furrow; notauli converging posteriorly .... 28.

28. Abdomen in female more than twice as long as the head and thorax united, very flat .... 27. **compressiventris** (Ashmead).
Abdomen in female not twice as long as the head and thorax united....... 29.

29. Females.. 30.
Males .... 32.

30. Antennae very long, the flagellum longer than the thorax. 28. **filicornis** (Ashmead).
Antennae much shorter, the flagellum shorter than the thorax............. 31.

31. Abdomen not more than twice as long as wide at apex of second tergite. 29. **coloradensis** (Ashmead).
Abdomen distinctly more than twice as long as wide 30. **californica** (Ashmead).

32. Fourth antennae joint viewed laterally about as wide as the third, not much flattened and hardly wider apically than basally. 29. **coloradensis** (Ashmead).
Fourth antennal joint two or three times as wide as the third, broad and flattened, slightly concave outwardly, much wider apically than basally. 30. **californica** (Ashmead).

33. Vertex angularly produced over the eyes................................ 34.
Vertex not produced over the eyes....................................... 37.

34. Ocellar triangle shagreened, not distinctly striate and never perfectly smooth. 35.
Ocellar triangle not shagreened, either stirate or smooth.................. 36.

35. Projection of vertex short, rounded, extending very slightly over the eye margin at the middle of its upper edge.................. 31. **solidaginis** (Ashmead).
Projection of vertex, compartively long, more acutely produced, extending over the eye margin at its posterior edge.................. 32. **pluto** (Ashmead).

36. Ocellar triangle smooth; head two and one-half times as wide as long; thorax less than one and one-half times as long as wide... 33. **utahensis** (Ashmead).
Ocellar triangle striate or at least never perfectly smooth, approaching the latter condition in the male; head about twice as wide as long; thorax one and one-half times as wide as long...................... 34. **striaticeps** (Ashmead).

37. Face above middle of eyes and below anterior ocellus, especially on the sides, distinctly and extensively, though often very finely, striate or aciculate.. 38.
Face in part mentioned not distinctly striate or aciculate................. 67.

38. Head less than twice as wide as long; frons coarsely transversely striate; first and second tergites not striate....................... 35. **vernalis** (Myers).
Head at least twice as wide as long; frons less coarsely striate; first and second tergites striate, the second never entirely so............................ 39.

39. Females... 40.
Males .... 53.

40. Fifth tergite shagreened, aciculate, or striate longitudinally.............. 41.
Fifth tergite not shagreened, aciculate or striate.......................... 43.

41. Fifth tergite longitudinally striate or aciculate; seventh and eighth antennal joints longer than wide... 42.
Fifth tergite strongly shagreened, seventh and eighth antennal joints wider than long.. 36. **viticola** (Ashmead).

42. Fifth tergite slightly longer than the fourth.......... 37. **leguminicolae** Fouts.
Fifth tergite nearly twice the length of the fourth... 38. **lupinicola** (Ashmead).

43. Seventh and eighth antennal joints wider than long or about as wide as long.. 44.
Seventh and eighth antennal joints longer than wide.......................... 47.

44. First tergite forming a perfect arc above, not angulate sublaterally and not declivous on the sides, the striae regularly placed and with no particular ones more prominent than others; second tergite neither extensively nor strongly striate.................................. 39. **cynipicola** (Ashmead).
First tergite flattened above, angulate sublaterally, declivous on the sides, at least not forming a perfect arc above.................................. 45.

45. Abdomen more than twice as long as wide...... 40. **actinomeridis** (Ashmead).
Abdomen not more than twice as long as wide.......................... 46.

46. Last joint of antenna, viewed laterally, twice as long as wide, conical, the apex acute.................................. 41. **artimesiae** (Ashmead).
Last joint of antenna less than twice as long as wide, the apex not acute. 42. **salicicola** (Ashmead).

47. Abdomen distinctly longer than the head and thorax united. 43. **virginiensis** (Ashmead).
Abdomen not distinctly longer than the head and thorax united............ 48.

48. Wings not extending beyond the apex of the abdomen.................... 49.
Wings extending distinctly beyond the apex of the abdomen.............. 50.

49. Tarsi of middle legs distinctly longer than the tibiae... 44. **atriplicis** (Ashmead).
Tarsi of middle legs not distinctly longer than the tibiae.................. 49a.

49a. Joints eight and nine less than twice as long as wide.. 45. **asynaptae** (Ashmead).
Joints eight and nine twice as long as wide............ 46. **texana**, new species.

50. First joint of middle tarsi viewed from above about three times as long as wide. 47. **burkei** (Rohwer).
First joint of middle tarsi four (or a little more) times as long as wide...... 51.

51. Fore-wings extending posteriorly half the length of the abdomen past the latter's apex.. 48. **hiemalis** Forbes.
Fore-wings not extending so far posteriorly, reaching slightly beyond the apex of the abdomen.. 52.

52. Median area on first tergite with many regularly placed longitudinal carinae. 49. **marylandica**, new species.
Median area with only one prominent carina........... 50. **euretiae** (Ashmead).

53. Ninth antennal joint not or only very indistinctly longer than wide......... 54.
Ninth antennal joint distinctly longer than wide......................... 56.

54. Fourth antennal joint much thicker than the pedicel.... 30. **viticola** (Ashmead).
Fourth antennal joint not or very slightly thicker than the pedicel.......... 55.

55. Abdomen long and narrow, about twice as long as wide; foveae on second tergite with a few striae on their inner slopes and with a few striae extending caudad from their upper margins....................... 43. **virginiensis** (Ashmead).
Abdomen broader, less than twice as long as wide; foveae striate over their entire surface, the striae extending fan-shaped upon the second tergite. 41. **artimesiae** (Ashmead).

56. Fourth antennal joint, measured from points of attachment, about as long as the combined lengths of the two joints following it..... 44. **atriplicis** (Ashmead).
Fourth antennal joint much shorter than the two joints following it....... 57.

57. Fourth antennal joint sharply produced below at apex.................... 58.
Fourth antennal joint rounded apically.................................. 60.

58. Second tergite closely and rather strongly striated at base.. 47. **burkei** (Rohwer).
Second tergite sparsely and finely striate basally......................... 59.

59. Abdomen three-fourths as wide as long................... 48. **heimalis** Forbes.
Abdomen three-fifths as wide as long................. 51. **atrae**, new species.

60. Abdomen as wide as the thorax.. 61.
Abdomen distinctly narrower than the thorax........................... 64.

61. Abdomen twice as long as wide .... 62.
Abdomen less than twice as long as wide .... 63.
62. Pedicel twice as long as wide .... 62a.
Pedicel one and one-half times as long as wide..40. **actinomeridis** (Ashmead)
62a. Fourth antennal joint narrowed at both ends..38. **lupinicola** (Ashmead).
Fourth antennal joint not narrowed at both ends..46. **texana**, new species.
63. Wings hyaline .... 45. **asynaptae** (Ashmead).
Wings brownish .... 52. **fumipennis**, new species.
64. Abdomen a little less than twice as long as wide..53. **laticeps** (Ashmead).
Abdomen not less than twice as long as wide .... 65.
65. First tergite nearly perpendicular on the sides, not flattened laterally. 49. **marylandica**, new species.
First tergite with a flattened area along the sides, the lateral edges sharp..... 66.
66. Second tergite rather strongly striate basally, the striae attaining the middle of the segment .... 54. **euurae** (Ashmead).
Second tergite less strongly striate, the striae not attaining the middle of the segment .... 43. **virginiensis** (Ashmead).
67. Scape entirely bright yellow or with an annulus of yellow basally .... 68.
Scape darker, not touched with yellow .... 71.
68. Scape entirely bright yellow .... 55. **longiventris** (Ashmead).
Scape yellow basally .... 69.
69. Abdomen in female longer than the head and thorax united .... 70.
Abdomen in female not longer than the head and thorax united; fourth antennal joint in male not emarginate basally, about as long and as wide as the pedicel. 56. **pentatoma** (Ashmead.)
70. Second tergite in female rather strongly narrowed anteriorly, the sides not parallel; fourth antennal joint in male crescent-shaped as in *hiemalis*. 57. **semiglaber** (Girault).
Second tergite in female not much narrowed anteriorly, the sides nearly parallel; fourth antennal joint in male not crescent-shaped...58. **linearis**, new name.
71. Head distinctly more than twice as wide as long when viewed from above, wider than the thorax across the tegulae .... 72.
Head not distinctly more than twice as wide as long, not or only slightly wider than the thorax .... 76.
72. Second tergite, in the region of the basal foveae, rather strongly longitudinally striate, the striae extending into the apical half of the segment. 59. **errans**, new species.
Second tergite not so strongly striate, the striae not extending into the apical half of the segment .... 73.
73. Abdomen in female less than twice as long as wide .... 74.
Abdomen in female two or more times as long as wide; fourth joint of male antennae not so closely joined to third, not strongly excised at base....... 75.
74. Abdomen broadly rounded posteriorly; segments three to six united half as long as the second; fourth joint of male antenna as in *hiemalis* Forbes. 60. **feltii** Fouts.
Abdomen more acute posteriorly; segments three to six four-sevenths times as long as the second; male unknown .... 61. **tumida** (Ashmead).
75. Abdomen in female broadly rounded posteriorly, not abruptly narrowed from the apex of the second segment, the sixth tergite much wider than long, eighth and ninth antennal joints in male longer than wide. 62. **columbiana**, new name.
Abdomen in female abruptly narrowed posteriorly from the apex of the second segment, pointed apically, the last tergite nearly as long as wide, eighth and ninth antennal joints in male not longer than wide.. 63. **baccharicola** (Ashmead).

76. Females.. 77.
Males.. 85.

77. Flagellum attenuate, all of the joints considerably longer than wide........ 78.
Ninth antennal joint never very distinctly longer than wide; flagellum stouter, not so attenuate.. 80.

78. Scutellum transverse, more or less flattened; fourth antennal joint in male hardly wider apically than the pedicel................ 64. **antennariae** (Ashmead).
Scutellum highly convex.. 79.

79. Scutellum transverse, very high, abdomen in female not or but little longer than the head and thorax united; fourth antennal joint in male about as wide at the apex as the pedicel.............................. 65. **pini**, new species.
Scutellum circular, not so highly elevated; abdomen in female considerably longer than the head and thorax united; fourth antennal joint in male distinctly wider at the apex than the pedicel................ 66. **rohweri**, new species.

80. Abdomen not more than twice as long as wide............................ 81.
Abdomen distinctly more than twice as long as wide...................... 82.

81. Reflexed margin of abdomen broad, usually horizontal, nearly half as wide as the swollen surfaces of the sternites between them.... 67. **huachucae** (Ashmead).
Reflexed margins of abdomen not so broad, usually sloping steeply inwardly.
68. **astericola** (Ashmead).

82. Abdomen not longer than the head and thorax united...................... 83.
Abdomen distinctly longer than the head and thorax united............... 84.

83. Foveal striae on second tergite extending beyond the middle of the segment.
69. **rubi** (Ashmead).
Foveal striae not extending beyond the middle of the segment.
70. **relativa**, new species.

84. Antennae and legs brownish or brownish yellow...... 71. **vernoniae** (Ashmead.)
Antennae piceous; legs dark brown to blackish..... 72. **variabilis**, new species.

85. Fourth antennal joint more or less emarginate basally and considerably widened apically.. 86.
Fourth antennal joint not distinctly emarginate basally and not especially widened apically.. 88.

86. Flagellum elongate, all the joints considerably longer than wide.
64. **antennariae** (Ashmead).
Flagellum shorter and stouter, none of the joints, except the last, much longer than wide.. 87.

87. Abdomen about twice as long as wide............... 71. **vernoniae** (Ashmead).
Abdomen less than twice as long as wide............ 67. **huachucae** (Ashmead).

88. Fourth antennal joint distinctly thicker than the pedicel.
72. **variabilis**, new species.
Fourth antennal joint not distinctly thicker than the pedicel.
68. **astericola** (Ashman).

1. PLATYGASTER APHIDIS Ashmead.

Platygaster aphidis, ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 325.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Survey, 1916 (1917), p. 541.

Male.—Length 1.6 mm. Head posteriorly almost smooth, not distinctly punctate; frons polished; antennae ten-jointed, black; pedicel as long as the first and second funiclar joints together, the first joint small, subtriangular, closely united to the second, the second somewhat swollen and slightly twisted; club six-jointed, the joints about twice as long as thick, subpedicellate; thorax seen from above about twice as long as wide; notauli complete, meeting in an acute point posteriorly; median lobe of mesonotum, and lateral lobes posteriorly along their inner margins, strongly shagreened; mesopleurae and lower part of pronotum polished; scutellum circular, convex, margined laterally, distinctly, but not very strongly, shagreened; wings hyaline, extending a little beyond the apex of the abdomen; abdomen about one and one-third times as long and about twice as wide as the thorax, a little less than twice as long as wide, broadly rounded at apex; second tergite at apex a little wider than long; basal fovea well marked but shallow, with a few striae which do not extend posterior to their apices; space between basal foveae traversed by several longitudinal striae. Black, legs dark brown.

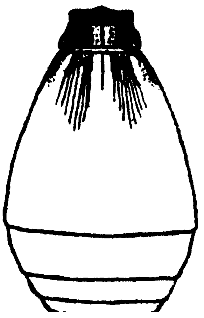

FIG. 4.—PLATYGASTER APHIDIS ASHMEAD. ABDOMEN OF MALE.

Type locality.—Richfield Springs, New York.

Type.—Cat. No. 2305, U.S.N.M.

Redescribed from the type specimen in the United States National Museum. The head of the type has been lost and all notes made above regarding it have been taken from the original description. If Ashmead was correct in his observations then *aphidis* is unique in this group of the genus in having the vertex unsculptured. The species is of a rather peculiar appearance with its long and broad abdomen, quite a rarity in the male sex.

2. PLATYGASTER AMERICANA (Ashmead).

Epimeces americanus ASHMEAD, Can. Ent., vol. 19, 1887, p. 129.

Ectadius americanus (Ashmead), CRESSON, Synopsis of Hymenoptera, 1887, p. 249.

Polymecus americanus (Ashmead), ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 279.

Female.—Length 1.9 mm. Head seen from above about twice as wide as long, seen from in front about the width of the eye wider than high; vertex subacute, with fine wavy striae, shagreened on the sides; ocellar triangle and small area just in front of and to the sides of the ocelli, shagreened; sides of frons covered with fine wavy aciculations directed transversely, the aciculations finer in the middle; face just above insertion of antennae rather finely transversely striate; projection between bases of antennae longer than wide, subemarginate at the apex; antennae rather stout; third joint a little longer than wide, a little shorter and considerably narrower than the fourth to which it is closely joined; pedicel about twice as long as wide, slightly longer than the fourth joint and nearly as wide; fifth and sixth joints about as long and as wide as the fourth, distinctly longer than wide; joints seven to nine quadrate when viewed from the side, the lower angles slightly prominent; last joint about one and one-half times as long as wide, acute at tip; thorax a little less than twice as long as wide; notauli complete; median lobe of mesonotum and inner half of lateral lobes rather finely shagreened; scutellum circular, margined laterally, shagreened like the thorax; wings of type lost; abdomen a little over twice as long as the thorax; first tergite about twice as wide as long, not distinctly striate, with a rather deep transverse depression across the middle; the dorso-lateral carinae rather prominent, second tergite about twice as long as wide at apical third, three-fifths as wide as thorax across the tegulae, not striate at base; segments after the second more or less cylindrical, the third a little wider than long, wider than high, twice as long as and about as wide at the apex as the first; fourth and fifth tergites subequal in length and width, a little less than twice as long as wide, one-third longer than the third; fourth a little wider basally than apically; last tergite triangular seen from above, a little longer than wide, half as long as the fifth. Shining black, legs reddish-brown, the coxae and femora darker; scape and pedicel yellowish-brown, the flagellum dark brown.

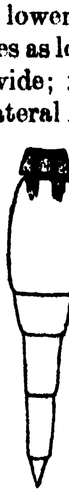

FIG. 5.—PLATYGASTER AMERICANA (ASHMEAD.) ABDOMEN OF FEMALE.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 24594, U.S.N.M.

Redescribed from one specimen of the type series in the United States National Museum. There are three specimens in the type series but two of them, representing as many species, do not agree with the original description. Each of them has the second tergite distinctly less than twice as long as wide. They remain undescribed, being in rather poor condition.

8. PLATYGASTER FLORIDENSIS Ashmead.

Platygaster floridensis ASHMEAD, Can. Ent., vol. 19, p. 132, female.—CRESSON, Synopsis of Hymenoptera, 1887, p. 250.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 324, pl. 13, fig. 1, female.

Female.—Length 0.90 mm. Head shaped as in *caryae*, much wider than the thorax; cheeks, occiput and vertex, shagreened, the latter aciculate medially; rest of head more or less shining, shagreened, faintly aciculate just above the antennae; antennae as in *caryae*; joint five shorter than six, very wide, sharply produced below distally; six to nine transverse, as wide as five; thorax a little over two-thirds as wide as long, strongly convex above, higher than wide, the tegulae far down on the sides; pronotum shagreened; mesonotum; finely shagreened; notauli distinct on basal half of mesonotum; median lobe narrowly truncated posteriorly; scutellum as in *caryae* but without the median groove; abdomen ovate, a little longer, but no wider, than the thorax, twice as long as wide, broadly rounded posteriorly; first tergite as in *caryae;* second not distinctly striate, a little longer than wide; tergites three to six polished, united less than half as long as the second; wings hyaline, extending the length of the last four segments past the apex of the abdomen. Coloration as in *caryae* Ashmead.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 24595, U.S.N.M.

Redescribed from two female types in the National Museum. One specimen has the abdomen missing. The male described in Ashmead's Monograph represents a different species. It remains undescribed.

4. PLATYGASTER OBSCURIPENNIS Ashmead.

Platygaster obscuripennis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 325.

Male.—Length 2 mm. Head two and one-half times as wide as long, narrower than the thorax, attached far down on the thorax; cheeks flattened, oblique, strongly shagreened; occiput rugose, traversed by large wavy carinae; vertex subacute, striate; frons shining, acioulate laterally, striate below, elevated medially into a transverse, broadly rounded ridge as wide as the eyes, this ridge with a deep broad furrow which extends from the anterior ocellus to the striations below; head seen from in front two-thirds as wide as long, the angles rounded; pedicel slightly longer than wide, a little narrower and longer than joint five; joint three triangular, narrower than the pedicel, as wide as long, closely attached to four; four as long as the pedicel, wider than any other joint in the flagellum, as wide as long, strongly excavated below at the base; five as wide as long; joints six to nine slightly wider than long; ten longer than the pedicel, acutely pointed apically, the sides straight; thorax not quite three-fourths as wide as long, of a very peculiar shape, widest before the tegulae, as long before the tegulae as behind it, very broad and rounded anteriorly, flattened above, nearly one and one-half times as wide as high, the pronotum bulging out on the sides above; pronotum shagreened laterally; mesonotum shagreened anteriorly and inwardly on the lateral lobes; median lobe narrowly truncated posteriorly; lateral lobes very broad and long, as wide as the median lobe at its middle; scutellum transverse, flattened, shagreened, sparsely pubescent on the sides, margined laterally; abdomen elliptical, slightly narrower than the thorax, twice as long as wide, as long as the head and thorax united; median area on first tergite quadrate, polished, the ridges sharp, the segment itself twice as wide as long; second tergite as wide as long, slightly narrowed anteriorly, the sides curved; basal foveae deep and broad, finely striate; median area striate; tergites three to seven polished, united three-fourths as long as the second;

three to five equally long, six shorter, equal in length to seven; seven broadly rounded apically; wings slightly infuscated, reaching a little beyond the apex of the abdomen. Shining black; antennae and legs dark brown.

Type locality.—Ottawa, Canada.

Type.—Cat. No. 2304, U.S.N.M.

Redescribed from the type male in the National Museum. Nothing is known of the habits of the species.

Only one male of this species is in the national collection but in the series as arranged by Ashmead there were four females labeled as this species by Ashmead. These specimens were collected on grass May 19, 1886, by F. M. Webster and had been labeled by Ashmead as types and assigned along with the male the museum type No. 2304. That they can not be types is obvious because the types were "received from Mr. W. H. Harrington" and collected at Ottawa, Canada.

Ashmead's description of the female[12] does not agree with the male type and seems to have been based on these four females.

This is one of the most remarkable species in the genus *Platygaster*. I know of no other in which the head is narrower than the thorax and of such an extraordinary shape. Ashmead's description gives no hint as to the true structure of the type and is a good example of his futile methods of description.

5. PLATYGASTER MELLISCAPA (Ashmead).

Polymecus melliscapus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 282.

Female.—Length 2.8 mm. Head seen from above slightly over twice as wide as long, about as wide as the thorax across the tegulae; seen from in front the head is the width of the eye wider than high; occiput rugosostriate; vertex subacute, strongly and coarsely transversely striate; cheeks strongly shagreened, rough; space above dorsal one-fourth of eyes to striae on vertex, strongly shagreened, below this area to the antennae strongly transversely striate; projection between the bases of the antennae wider than long, truncate apically; antennae stout, the flagellum gradually incrassated toward tip; scape as long as the next five joints united, not much curved, slightly swollen apically; pedicel about twice as long as wide, nearly as long as the next two joints united; third joint as wide as long, narrowed basally, slightly narrower than and a third shorter than the fourth which is one-fourth longer than wide and a little longer than the fifth; fifth about as wide as long, approximately as long as the sixth; seventh about as wide as long, narrowed slightly basally; eighth and ninth a little wider than long, as wide as the seventh; last joint one-third

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[12] Bull. 45, U. S. Nat. Mus., 1893, p. 325

longer than wide at base, abruptly subacute at the apex; thorax distinctly less than twice as long as wide, broadly rounded anteriorly, abruptly narrowed behind the tegulae; notauli complete; mesonotum a little longer than wide, with two short subobsolete carinae anteriorly; middle lobe and upper part of lateral lobes strongly shagreened; upper part of pronotum rather finely shagreened; legs stout, femora and tibiae strongly clavate; wings covered with brown pubescence, extending about to the apex of the fifth abdominal segment; abdomen about twice as long as the thorax; first tergite twice as wide as long, not striate, the dorso-lateral carinae prominent, the space between them about twice as long as wide; second sternite, metapleurae, propodeum laterally, hind coxae below, and foveae basally (on second tergite) densely covered with long grayish-white hairs; second segment almost as wide at the apex as long, very closely joined to the first, as wide at the apex as the thorax across the tegulae, widest at the apex and narrowing gradually to the base, the sides continuous with those of the first tergite; basal foveae on second tergite deep and rather broad, with six or seven striae extending posteriorly from their inner margins to the middle of the segment; abdomen from the apex of the second segment narrowing gradually to an acute point at tip; third segment about one and one-half times as wide as long, without pubescence, the sides oblique; fourth as wide at the apex as long, wider basally than apically, nearly twice as long as the third, with a few scattered hairs laterally; fifth tergite one and three-fifths times as long as wide, with scattered white hairs laterally, about twice as long as the third and considerably narrower than that segment, the sides parallel; sixth tergite triangular, one and one-half times longer than wide at the base, acute at tip, two-thirds as long as the fifth. Shining black, legs (except last tarsal joints which are fuscous), and scape, rufous; flagellum fuscous.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 24596, U.S.N.M.

Redescribed from the type specimen.

6. PLATYGASTER LAEVICOLLIS (Ashmead).

Polygnotus laevicollis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 320.

Male.—Length 1 mm. Head seen from above two and one-half times as long as wide, not excavated posteriorly, slightly convex anteriorly; occiput moderately shagreened; cheeks for the most part unsculptured; vertex shagreened on the sides, transversely striate medially; ocellar space finely shagreened; upper part of frons finely shagreened, more delicately so medially; face above insertion of antennae transversely striate; projection between antennae quadrate, truncate apically, with the lateral edges raised into ridges;

scape rather slender, reaching to the lateral ocelli, not much narrowed proximally and but slightly curved; pedicel slightly longer than wide, much narrowed proximally; third joint very short and so closely joined to the fourth as to make them both look like one joint; fourth joint about as wide as long, greatly swollen, about as thick as the scape and as long as the pedicel; fifth joint as long as wide, as wide as the pedicel; "club 6-jointed, all the joints, except the last, transverse, the last conical, a little more than twice the length of the penultimate"; thorax across the tegulae as wide as the head, one and one-half times as long as wide; notauli complete, meeting in an acute point posteriorly, the latter projecting but slightly over the scutellar fovea; median lobe of mesonotum (except posteriorly where it is indistinctly longitudinally striate) shagreened; lateral lobes inwardly toward the front and medially behind, shagreened, otherwise unsculptured; scutellum convex, shagreened, a little wider than long, sloping posteriorly, margined at the sides; abdomen as long as the thorax, triangular from its base to the apex of the second tergite, as wide as the thorax; first tergite twice as wide as long, the sides oblique; dorso-lateral carinae not very prominent, not pubescent; second tergite a little longer than wide at the apex, twice as wide at the apex as at base, the sides slightly curved; basal foveae well marked, not pubescent, striate on their inner slopes, the striae few and not extending beyond basal third of the segment; tergites beyond the second short and narrowing abruptly to the apex, united about one-third as long as the second; wings extending about the length of the abdomen past its apex, hyaline, broad apically, the pubescence inconspicuous. Black, legs dark brown to piceous; antennae the same color as the front legs, brownish-yellow.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 24598, U.S.N.M.

Redescribed from the type specimen in the United States National Museum. The antennal joints beyond the fifth are missing from the type.

7. PLATYGASTER RUFIPES (Ashmead).

Synopeas rufipes ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 287, pl. 12, fig. 5, Female.

Female.—Length 1.5 mm. Head seen from above a little over twice as wide as long, somewhat excavated posteriorly, seen from in front broadly elliptical, a little more than the width of the eye wider than high; occiput and vertex strongly striate, the latter rather acute; cheeks strongly shagreened, roughened; ocellar space and frons above and on the sides more finely shagreened than the cheeks, more finely yet in the center of the face where wavy aciculations are discernible; frons just above insertion of antennae rather finely transversely striate;

antennae rather stout; scape long, curved and narrowed basally, slightly curved and widened apically, about as long as the following six joints united; pedicel about twice as long as wide, it and the three following joints subequal in width; third joint two-thirds the length of the second, as long as the fourth; fifth spherical; sixth as wide at the apex as long, slightly narrowed proximally, as wide as the fifth; seventh, eighth, and ninth joints a little wider than long, somewhat longer than the sixth; last joint nearly as long as the pedicel, blunt at the tip and distinctly less than twice as long as wide; thorax shaped as in *melliscapus*; notauli sharply indicated but not attaining the anterior margin of the mesonotum; median lobe of mesonotum finely shagreened (except in the region of the apex where it projects in a rather broad tongue-like plate over the scutellar fovea); lateral lobes of the mesonotum finely shagreened (except in the middle where they are unsculptured); scutellum convex, not very much elevated, somewhat triangular, slightly broadened at the base, but not depressed laterally as in some forms of *Leptacis*, rather densely covered with decumbent whitish hairs; metapleurae and sides of propodeum covered with pubescense similar to that on the scutellum; abdomen spatulate, as long as the thorax and about as wide at the apex of the second tergite as the thorax; first and second tergites without pubescence; first polished, the dorso-lateral carinae not very prominent and the central area only a little longer than wide; second tergite a little wider at the apex than long, much narrower anteriorly; basal foveae distinct, not striate; third, fourth, and fifth tergites much wider than long, subequal in length, becoming rapidly narrower posteriorly; sixth tergite wider than long, subacute at apex; wings extending slightly beyond the apex of the abdomen, greyish brown, pubescent. Shining black; legs (except hind coxae) and antennae (except last five joints), rufous; hind femora brownish; hind coxae and last five antennal joints piceous.

Type locality.—Arlington, Virginia.

Type.—Cat. No. 24597, U.S.N.M.

Redescribed from the type specimen. The species is rather peculiar with its varicolored antennae and slightly broadened scutellum but nevertheless it is a true *Platygaster* and illustrates one of the many variations from the typical form of the genus.

8. PLATYGASTER CARYAE Ashmead.

Platygaster caryae ASHMEAD, Bull. 45. U. S. Nat. Mus., 1893, p. 323.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv. 1916., (1917), p. 540.

Female.—Length 2.30 mm. Head twice as wide as long, wider than the thorax, flattened in front, emarginate behind; cheeks flattened, coarsely shagreened; occiput rugose, with several longitudinal carinae medially; vertex subacute, strongly shagreened, striate medially; interocellar space punctate or granular; face more or less shining, shagreened, strongly transversely striate below; pedicel two and one-half times as long as wide, as long as joint four, a little longer and wider than three; four as wide as two, obliquely excised at apex, narrower than five; five to nine transverse, each sharply produced below at apex; ten a little shorter than three, not much longer than wide, broadly rounded apically; thorax more than one and one-half times as long as wide, convex above, higher than wide, the tegulae situated one-third down from the dorsal surface; pronotum shagreened; notauli nearly complete, well indicated to anterior fourth of mesonotum, converging posteriorly; mesonotum shagreened, the lateral lobes exteriorly polished, pubescent at their apices; scutellum transverse, highly convex, shagreened, sparsely pubescent, with an indistinct longitudinal furrow dorsally; abdomen broadly elliptical, wider and a little longer than the thorax, somewhat less than one and one-half times as long as wide; first tergite twice as wide as long, polished, the median area quadrate, unsculptured, sharply defined laterally; second tergite about as wide as long; basal foveae deep and broad, oblique, polished, but with numerous striae radiating from them to a little beyond the middle of the segment; median area strongly striate to the apex of the fovea, with a central carina; tergites three to six polished, united less than one-third as long as the second; six broadly transverse, subacute apically; wings hyaline, extending one-half the length of the second tergite past the apex of the abdomen. Black; tegulae, coxae, and first abdominal segment reddish-brown; last six antennal joints fuscous; rest of antenna, and legs, straw colored, the hind legs brownish.

Male.—Length 2.30 mm. Pedicel three times as long as wide, longer and a little narrower than joint four, twice as long as three; three longer than wide, as wide as four; four more than twice as long as wide, curved, cylindrical, with a sharp knife-like edge below; five as long as six, narrower; joints six to nine a little longer than wide, rounded apically; ten longer, subacute apically; abdomen ovate, a little longer than the thorax, two-thirds as wide as long; first tergite as in the female; second not at all striate, otherwise as in female; tergites three to seven polished, united one-third as long as the second; wings extending nearly the length of the second segment past the apex of the abdomen.

Type locality.—Washington, District of Columbia.

Other localities.—Jacksonville, Florida, and St. Louis, Missouri.

Type.—Cat. No. 2303, U.S.N.M. Type female and allotype male selected from specimens from Washington, District of Columbia.

Redescribed from the type series, 10 females and 3 males, in the National Museum in Washington. These specimens were reared, May 8, 1884, from Cecidomyid galls on hickory trees. There are also in the collection numerous paratypes from Jacksonville.

Some of the specimens in the paratype series seem to represent other species but the material is not in good condition for study and no attempt has been made to sort out the forms included. No specimen from St. Louis, Missouri, was found in the collection.

9. PLATYGASTER FUSCIPENNIS, new species.

Female.—Length 1.73 mm. Similar in a general manner to *striaticollis* Ashmead. Head twice as wide as long, arcuately emarginate behind, wider than the thorax; cheeks flattened, shagreened; antennae moderately stout; pedicel a little over twice as long as wide, nearly as long as joints three and four united, as wide as four; three narrower than two, three-fourths the length of four, one and one-half times as long as wide, subequal to five (but not narrowed basally); six as long as five but a little wider; seven to nine about as wide as long; ten slightly longer, blunt at tip; mesonotum shagreened; lateral lobes on the outside polished; scutellum strongly shagreened, sparsely pubescent; abdomen the length of the first segment longer than the head and thorax united, as wide as the thorax; median area on first tergite a little longer than wide, with a short carina basally; basal foveae on second tergite deep, with a few short striae on their inner margins, the striae not attaining the middle of the segment; a few striae between the foveae; wings brownish, extending three-fourths the length of the second segment past the apex of the abdomen. Shining black; most of antennae and legs brownish-yellow; joints six to ten of the antenna, hind femora entirely, and tibiae apically, tinged with fuscous.

Type locality.—Glen Echo, Maryland.

Type.—Cat. No. 25432, U.S.N.M.

Described from three specimens collected by the author at Glen Echo. Two bear the data "1917"and the other "VI-16-1919." I know nothing of the habits of the species. Paratypes in Collection Fouts.

10. PLATYGASTER STRIATICOLLIS (Ashmead.)

Polygnotus striaticollis Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 319.

Male.—Length 1.2 mm. Head shaped as in *laevicollis* Ashmead; occiput rugose; vertex rugose laterally, striate medially; ocellar triangle with a few fine wavy transversely directed striae, very low, a line drawn from lateral ocellus to lateral ocellus across their top margins touching the posterior edge of the anterior ocellus; face around the ocelli shagreened with striae intermingled, below the upper third of eyes striate, finely medially, becoming coarser toward the antennal sockets; projection between antennae shaped as in *laevicollis;* "the pedicel much longer than the first and second funiclar joints, which are small, the second being wide at apex than long; club 6-jointed, pilose, the joints loosely joined, and all except the last, transverse monili form"; last joint twice as long as wide, acute at tip; pronotum shagreened above, strongly longitudinally striate on sides; notauli complete, coming together in a rather broad lobe which almost touches the scutellum; mesonotum shagreened as in *laevicollis;* scutellum indistinctly transverse, convex, shagreened, margined laterally, not hairy; metapleurae, propodeum, first tergite (except in central area which is polished) and bases of foveae on second tergite, covered with short white hair; first tergite twice as wide as long, the dorso-lateral carinae distinct but not prominent, the median area about as wide as long; abdomen about as long as the thorax, shaped as in *laevicollis*; second tergite a little longer than wide at the apex; basal foveae distinct, the striae upon their inner slopes few, extending to the basal third of the segment; third tergite less than twice as long as the fourth, many times wider than long; segments after the second united about one-third as long as the second. Wings whitish, colored as in some *Microgasterines*, projecting the length of the first tergite past the apex of the abdomen, the pubescence sparse and short. Black; legs more or less rufous, the coxae and most of femora and tibiae darker; mandibles rufous; antennae brown.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 24599, U.S.N.M.

Redescribed from the type specimen in the United States National Museum. The antennae, except the last two joints, have been lost. The lines quoted above were taken from the original description.

11. PLATYGASTER CANADENSIS (Ashmead).

Ectadius canadensis ASHMEAD, Can. Ent., vol. 20, 1887, p. 50.
Polymecus canadensis (Ashmead), ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 278.

Female.—Length 3.10 mm. Head seen from above about twice as wide as long, flattened posteriorly and feebly convex anteriorly, the cheeks rather full; occiput and vertex traversed by rather coarse, wavy striae; vertex rounded; ocellar space finely shagreened; area around ocelli and above dorsal third of eyes finely shagreened; rest of face (except just above antennal socket where there are a few strong striae) covered with fine wavy aciculations; projection between antennae about as wide as long, truncate apically, carinated laterally; antennae stout, gradually incrassated toward tips; scape about as long as the next five joints united, slightly swollen before the apex; pedicel twice as long as wide, narrowed proximally; third joint about half as long as the second, narrower than the second, a little longer than wide, very closely joined to the fourth which is nearly as long as and a little thicker than the pedicel; fifth and sixth joints subequal in length and width to the fourth; seventh and eighth joints a little longer than wide; ninth quadrate; last joint a little less than twice as long as wide, rather blunt at tip; thorax one and one-half times as long as wide, rounded anteriorly, truncated posteriorly; pronotum shagreened above and medially on the side; on the anterior, posterior, and lower parts of the lateral plate it is polished, unsculptured; pronotum above traversed longitudinally by two sharp curved ridges which lie directly behind the anterior ends of the notauli; notauli complete, meeting posteriorly in a rather sharp point which projects nearly over the scutellar fovea; median lobe of mesonotum uniformly shagreened; lateral lobes shagreened on the inner sides; scutellum circular seen from above, margined laterally, as strongly shagreened as the mesonotum, not hairy; metapleurae, propodeum laterally, first tergite laterally, and second tergite at the bases of the foveae covered with semierect whitish hairs; abdomen about twice as long as the head and thorax united, widest at the apex of the second tergite where it is slightly narrower than the thorax; first tergite twice as wide as long, the dorso-lateral ridges sharp but not high, the central area a trifle wider than the lateral areas, 'quadrate, with a few inconspicuous carinae basally; second tergite about one and three-fourths times as long as wide at the apex, the sides parallel on apical half, converging slightly anteriorly; this segment and the first united as long as the thorax; basal foveae well marked, with a few faint striae which do not extend posterior their apices; area between the foveae on each side with a few striae which reach to basal third of the segment; third tergite one and one-half times as wide basally as apically, slightly wider apically than long, the sides straight, oblique; fourth tergite about twice as long as wide, a little wider basally than apically, one and one-half times as long as the third; fifth tergite about three times as long as wide, the sides parallel, slightly longer than the fourth; sixth triangular, as long as the fourth, twice as long as wide, sharply pointed distally; wings extending a little beyond the apex of the fourth segment, subhyaline, pubescent. Black, legs rufous; terminal tarsal joints and flagellum of antenna piceous; scape dark reddish brown; pedicel touched with yellow distally.

Type locality.—Ottawa, Canada.

Type.—Cat. No. 24600, U.S.N.M.

Redescribed from the type specimen in the United States National Museum. This is one of the forms which Ashmead considered belonged in *Polymecus* Foerster. Had he read Foerster more carefully he would have seen that no mention was made of any unarmed scutellum in the group. *Polymecus* Foerster always has the scutellum armed and differs in no way from *Synopeas* Foerster (except in the elongation of the abdomen in the female sex). *Synopeas* and *Polymecus* must both be considered synoyms of *Leptacis* Foerster as will be indicated in my discussion of the genus *Leptacis* on a subsequent page.

12. PLATYGASTER PICIPES (Ashmead.)

Polymecus picipes Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 282.—Brues, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 535.

Female.—Length 1.80 mm. Head transverse, about twice as wide as long; occiput rugose; vertex shagreened, with a few strong striae medially, rounded; ocellar space and area round each lateral ocellus rather strongly shagreened; upper half of face on sides with moderately fine striae directed downward toward the center of the face; area directly below anterior ocellus unsculptured; center of face covered with fine wavy aciculations; area just above and to the side of the antennal sockets strongly transversely striate, shining, not rugose; antennal projection quadrate, the edges at apex and on sides ridged, with a delicate median carina; pedicel twice as long as wide, third joint inconspicuously shorter than, and as wide as, the fourth, the latter hardly longer than wide; fifth joint triangular, as wide as long, as long as the fourth; seventh joint about as long as wide; eighth and ninth distinctly transverse; tenth a little longer than wide, broadly rounded apically; thorax short and thick, one and one-half times as long as wide; pronotum shagreened above, strongly longitudinally striate on the sides, medially between the two longitudinal ridges unsculptured; notauli complete, meeting in an acute point posteriorly which projects over the fovea and touches the scutellum; median lobe shagreened, polished posteriorly with a few faint aciculations, anteriorly with the short median ridges obsolescent; lateral lobes shagreened anteriorly and along their inner margins; scutellum convex, transverse, margined laterally, rather strongly shagreened; metapleura, propodeum, first tergite, except median area, and proximal half of basal foveae thickly clothed with short silvery hairs; abdomen to the end of the fourth segment as long as the head and thorax combined; first tergite as in *canadensis* Ashmead; second twice as long as wide at the base, a little wider apically, as wide as the thorax; third about four times as wide as long, the sides oblique; fourth one and one-half times as long as the third, twice as wide as long, the sides oblique, half as wide apically as the second tergite; fifth one and one-third times as long as the fourth, as long as wide at base, the sides distinctly but only moderately oblique; last segment nearly as long as the third and fourth united, about twice as long as wide at the base, sharply pointed apically and with the sides straight; wings brownish, pubescent, extending to the apex of the fifth segment of the abdomen. Black, legs and antennae dark brown to piceous, the tarsi somewhat lighter colored.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 2272, U.S.N.M.

Redescribed from the type specimen in the United States National Museum. The original type series consisted of three female specimens. These represent two species. Some time after describing *picipes*, Ashmead saw that two species were represented in his type series and selected one specimen as the type, giving it the type number listed above. I consider this specimen the type and my description is based upon it. The other two specimens remain undescribed.

18. PLATYGASTER VANCOUVERENSIS (Ashmead).

Polymecus vancouverensis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 281.

Female.—Length 3 mm. Head slightly less than twice as wide as long seen from above, very full behind the eyes, the cheeks wider than the eyes; occiput and vertex uniformly moderately shagreened; cheeks and spot in center of vertex more finely shagreened; ocellar triangle and area around ocelli shagreened as strongly as the occiput and vertex on the sides; frons subopaque, very finely uniformly shagreened, just above the antennal projection with a few small transversely directed carinae; antennal projection truncate distally, excavated with the edges raised; antennae moderately stout; scape slightly curved, a trifle shorter than the six following joints united; pedicel twice as long as wide at apex, as long as the two following joints united and about as thick as the fourth at apex; third joint half as long as the fourth, as long as wide and a little narrower than the fourth; joints four and five subequal in length and width, a little longer than wide; six as wide as long, the sides oblique; seven as wide as long and considerably thicker than the sixth, wider apically than basally; eighth and ninth joints subequal in length and width to the seventh, their outer angles slightly produced; tenth joint as long as the pedicel and a little wider than that joint, ovalo-conical, not acutely pointed, the sides on basal half parallel; thorax about twice as long as wide, shining, a little narrower across the tegulae than the head; pronotum rather strongly shagreened except below and behind on the sides, with a few faint striae below, the two longitudinal ridges neither high nor sharp; mesonotum somewhat flattened; notauli complete; median lobe entirely shagreened, projecting upon the scutellum in a sharp point; scutellum slightly transverse seen from above, shagreened, margined laterally, with a few short scattered hairs on the sides; abdomen about twice as long as the head and thorax united, polished, at the apex of the second segment a little wider than the head, from the second segment narrowing gradually to the apex; first tergite laterally, and second tergite at the bases of the foveae, covered rather densely with white pubescence; first tergite twice as wide as long, the median area a little longer than wide, with a few longitudinal carinae; second tergite one and one-half times as long as wide at the apex, nearly three times as wide at apex as at base, the sides somewhat curved; foveae distinct, with a few faint striae at their inner margins; third tergite a little longer than the first, about three times as wide as long, the sides oblique; fourth one and one-half times as long as the third, twice as wide across the middle as long, the sides as oblique as those of the third; fifth one and one-third times as long as wide at apex, the sides very slightly oblique, last tergite inconspicuously shorter than the fifth, about one and one-half times as long as wide, sharp at tip, longitudinally aciculate in a rather broad arc at basal third and along the sides to the apical fourth; wings extending to the apex of the fifth segment, hyaline, the pubescence scattered and inconspicuous. Black; antennae, coxae, trochanters, femora, tibiae (except at base) and last joint of each tarsus dark reddish-brown; anterior tibiae, tarsi and tibiae basally, yellowish brown.

Type locality.—Vancouver Island.

Type.—Cat. No. 24601, U.S.N.M.

Redescribed from the type specimen in the United States National Museum. I have removed the antennae from the type and put them on a slide.

14. PLATYGASTER CONFUSA, new name.

Ectadius pallipes ASHMEAD, Bull. No. 1, Col. Biol. Assoc., 1890, p. 9.

Polymecus pallipes (Ashmead), ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 279, pl. 12, fig. 3, female. Preoccupied by *Platygaster pallipes* Say, LeConte Ed. Say, vol. 1, p. 383.

Female.—Length 2.60 mm. Head a little less than twice as wide as long, full behind the eyes, emarginate behind, slightly elevated in the middle of the face; vertex, occiput, interocellar area, and upper part of cheeks strongly shagreened; frons (except immediately above antennae where it is rather finely transversely striate) shagreened, not quite so strongly as are the vertex and occiput; antennal projection emarginate apically, the lateral ridges sharp and with a narrow median projection between them; scape long, rather slender, reaching beyond the lateral ocelli, not much curved, as long as the six following joints united; pedicel distinctly over twice as long as wide, third joint as long as wide, a little narrower than the second, half as long as the fourth; fourth twice as long as wide, as wide as the second; fifth and sixth as long and as wide as the fourth; seventh, eighth, and ninth nearly as long as the pedicel, distinctly longer than wide; last joint as long as the third and fourth united, as wide as the ninth, twice as wide as long, rather blunt at tip, the sides on basal two-thirds parallel; thorax about twice as long as wide; pronotum shagreened (except between the longitudinal ridges above, and below and behind on the sides), not striate anywhere; mesonotum subconvex with two low polished ridges on anterior third; notauli complete; median lobe shagreened, more finely so posteriorly, pointed at apex; lateral lobes shagreened except laterally on posterior two-thirds; scutellum subconvex, shagreened, indistinctly transverse, margined laterally; metapleurae, propodeum, first sternite, first tergite in apical angles, and second tergite in basal foveae, densely covered with white hairs; abdomen shaped much as in *vancouverensis* Ashmead, distinctly less than twice as long as the head and thorax united; median area on first tergite longer than wide, with a delicate median carina basally; second tergite one and one-half times as long as wide at apex, nearly twice as wide apically as basally; basal foveae deep, smooth except on interior edges where there are a few striae, these not extending posteriorly beyond their apices; third tergite twice as wide at apex as long, wider basally, the sides oblique, straight; fourth as wide at base as long, narrower apically, the sides not quite so oblique as those of the third; fifth twice as long and half as wide as the third, twice as long as wide, the sides parallel; sixth two-thirds as long as the fifth, sharply pointed apically, slightly less than twice as long as wide, shining and unsculptured; abdomen (with exceptions noted above) polished; wings extending to apical third of fifth tergite, faintly infuscated, the pubescence short but densely distributed. Black; legs golden yellow, the coxae reddish-brown; last joint of each tarsus inconspicuously darker; basal six antennal joints golden yellow, the apical joints dark brown; mandibles rufous, yellowish at tips.

Male.—Length 2 mm. Characters common to both sexes are not referred to in the description of the allotype. Pedicel slightly less than twice as long, as wide as the scape at apex; third joint button-shaped, wider than long, closely joined to the fourth and much narrower than the fourth; fourth thicker than the scape at its widest part, extraordinarily thickened, recalling the males in the genus *Eritrissomerus;* fifth joint very slightly longer than wide; following joints longer than wide, becoming a little more elongated toward the apex of the antenna; tenth joint narrower, three times as long as wide, as long as the fifth and sixth united, sharply pointed apically; abdomen spatulate, blunt posteriorly, as long as the head and thorax united, wider at the apex of the second segment than the thorax across the tegulae; wings extending half the length of the abdomen past its apex. Antennae uniformly golden yellow.

Type locality.—Greeley, Colorado.

Type.—Cat. No. 2122, U.S.N.M.

Redescribed from the type material in the United States Nationa Museum. Ashmead's original type series consisted of four females and two males. One of these males is not *confusa*, having (among other differences) the legs and antennae dark brown. I have identified one of the male types of *Platygaster nigrifemur* Ashmead as belonging to this species.

15. PLATYGASTER NIGRIFEMUR (Ashmead).

Ectadius nigrifemur Ashmead, Bull. No. 1, Col. Biol. Assoc., 1890, p. 10.
Polymecus nigrifemur (Ashmead), Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 280.

Female.—Length 3 mm. Head more or less oblong seen from above, with the angles rounded, somewhat less than twice as wide as long, slightly emarginate behind, subconvex in front, a little wider than the thorax; head entirely uniformly shagreened and shining except just above the bases of the antennae where it is transversely aciculate; cheeks convex, subangulate exteriorly, and wider antero-posteriorly than the eyes; pedicel twice as long as wide, as long as joints three and four united, as wide as four, slightly wider than three; joint three as long as wide, scarcely narrowed basally; four a little longer than wide, subequal to five and six, cylindrical, not narrowed apically or basally; joints seven to nine about as wide as long; ten a little longer than three and four united, subacute apically, the sides curved; thorax two-thirds as wide as long, as wide as the abdomen, flattened above, higher than wide; pronotum finely shagreened laterally; mesonotum shagreened, except medially on the lateral lobes; notauli complete, the median lobe pointed apically; scutellum transverse, convex, shagreened, margined laterally, pubescent on the sides; metapleurae, propodeum, first tergite laterally, first sternite, and second in the foveae, densely covered with matted silvery hairs; abdomen one and seven-tenths times as long as the head and thorax united; median area on first tergite not sharply defined, longer than wide, with several short carinae basally; basal foveae on second tergite broad and deep, polished as is also the rest of the abdomen; median area unsculptured; wings hyaline, extending slightly beyond the apex of the fifth tergite. Black; antennae piceous; legs brown.

Male.—Length 2.5 mm. Joint three of antenna half as long, and about half as wide as four, as wide as long; four a little wider than long, cylindrical, curved above, wider than any of the following joints, as long as the pedicel; joints five to nine a little longer than wide; ten longer than three and four united, sharply pointed apically, the upper side regularly curved; abdomen elliptical, longer by the length of the first segment than the head and thorax united, a little over twice as long as wide, narrowly truncated apically; segments three to seven united about half as long as the second; wings reaching the length of the last two segments past the apex of the abdomen.

Type locality.—Greeley, Colorado.

Type.—Cat. No. 2123, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, two females and three males, in the collection of the National Museum at Washington. One female type has the head and wings lost. All specimens mounted on card points.

16. PLATYGASTER HERRICKII Packard.

Platygaster herrickii Packard, Third Rep. U. S. Ent. Comm., p. 220.—Riley, Proc. U. S. Nat. Mus., vol. 8, p. 420, pl. 23, fig. 6, male.—Ashmead, Can. Ent., vol. 19, 1887, p. 132.—Cresson, Syn. of Hym., 1887, p. 250.—Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 324.—Brues. Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 540.

Aneurhynchus aneurus Provancher, Addid, Fauna Ent. Can., 1887, p. 176, male.

Female.—Length 2 mm. Body moderately robust, beautiful in outline and sculpture; head as wide as the thorax, about twice as wide as long, flattened in front, slightly excavated posteriorly; cheeks very full, convex, swelling out from the posterior margin of the eyes; head shining, shagreened; frons medially polished; area just above the insertion of the antennae covered by quite a number of large transverse carinae, the carinae not quite reaching to the eye margin; ocelli triangularly situated, the lateral ones elliptical, a trifle nearer to the eye margin than to the anterior ocellus; scape slender, nearly as long as the head is high, two-thirds as long as the flagellum; pedicel a little more than twice as long as wide, as wide as joint four, nearly as long as joints three and four united, narrowed basally, third joint slightly longer than wide, half as long as the pedicel; joint five about as wide and as long as the fourth, as long but slightly narrowe, than the sixth; joints six through nine subequal in length and width, a little longer than wide; joint ten a little longer than the ninth, distinctly narrower than the ninth, twice as long as wide; it is rounded above at the apex, acute below; thoracic ratio: length 38 (0.844 mm.), width 25, height 28; dorsum of thorax shagreenedr finely scaly (except the lateral lobes of the mesonotum which are polished on the sides near the tegulae); notauli complete, deeply indicated; median lobe of the mesonotum strongly narrowed posteriorly, truncated just in front of the scutellum, its free end reaching over the scutellar fovea; pronotum mostly polished, with a narrow band of shagreening medially; mesepisternum polished, with the dorsal suture rather deep, ʌ-shaped; sterno-pleural suture distinct; scutellum circular seen from above, evenly convex, finely scaly, sparsely pubescent, with the lateral margins rather low; propodeum laterally and metapleurum densely covered with long brownish hairs; tegulae polished, ferruginous apically; abdomen elliptical, 1.10 mm. long, as wide as the thorax, twice as long as wide, convex, above and below; first tergite not quite twice as wide as long, pubescent laterally and along its posterior margin, its anterior edge raised as a narrow transverse rim; median area of first tergite a little longer than wide, with an obsolescent median carina; first sternite densely pubescent, the hairs similar to those on the dorsum of the same segment and on the sides of the propodeum; second tergite polished, about one-fifth of its own length longer than wide, twice as wide at the apex as at the base, the sides slightly curved; basal foveae deep and broad but rather short, densely pubescent, polished, with several carinae along their inner margins; second sternite densely pubescent basally; tergites three to six polished, subequal in length, each traversed by a row of short white hairs; last five segments united not quite half as long as the second; sixth tergite triangular, sharply pointed apically, a little wider than long, one-third as wide as the third segment; wings hyaline, 1.83 mm. long, with a short marginal fringe. Black; legs varying from piceous to light brown or stramineous, the anterior tibiae apically and all tarsi pale; antennae dark brown.

Male.—Length 1.5 mm. Pedicel a little longer than the fourth joint, twice as long as wide, twice as long and twice as wide as joint three; fourth joint wider than any of the following joints, not much longer than wide, cylindrical; fifth joint as long and as wide as the pedicel; joints six to nine subequal, cylindrical, about one and one-half times as long as wide, wider and longer than joint five, thickly covered with white hairs which equal in length half of the diameter of the joints to which they are attached; joint ten three times as long as wide, as wide as joint nine; abdomen obovate, with the apical segments distended a little less than two-thirds as wide as long, rounded apically, segments three to seven polished, each traversed by a row of short white hairs.

Localities.—Western and Northern States.

Described from a series of 21 specimens. Eight of them, four females and four males, are labeled "448" with the dates varying from March 24 to April 15, 1884. Ten specimens are labeled "448" and were reared, as several other labels indicate, during the period April 4–19, 1889, from old wheat stubble. No more data in regard to this material is available, either on the pins or in the files of the Bureau of Entomology. A male specimen labeled "*Aneurhynchus aneurus* Prov. Type" is in the national collection and belongs to this species. This specimen is mentioned by Ashmead but can not be a type, as the original description makes no reference to the male. There is also in the collection a female specimen from Pickaway County, Ohio, labeled: "Reared from Phytophaga destructor; 3-1-21; W. H. Larrimer Coll.; Lafayette No. 20115."

The species does not seem to show any marked variation. Some of the males are less strongly sculptured than others. The posterior part of the mesonotum in such specimens tends to become smooth and polished.

17. PLATYGASTER LAMPRONOTA, new species.

Female.—Length 1.09 mm. Head twice as wide as long, slightly emarginate behind, a little wider than the thorax; cheeks convex shagreened posteriorly; occiput finely aciculate; interocellar area shagreened; frons polished; antennae filiform; pedicel as wide as joint six, as long as joints five and six or three and four united; three and four equally wide, narrower than two; three a little shorter than four; five and six subequal, a little longer than wide, wider than six; ten as long and as wide as the pedicel, conical, pointed apically; flagellum longer than the thorax; thorax two-thirds as wide as long, convex above, higher than wide; pronotum finely shagreened laterally; mesonotum polished, finely shagreened anteriorly; notauli complete, the median lode narrowly rounded posteriorly; scutellum circular, polished, finely shagreened on the sides, sparsely pubescent; abdomen the length of the last two segments longer than the head and thorax united, broadly elliptical, wider than the thorax, twice as long as wide; median area on first tergite quadrate, without sculpture, the ridges high and sharp; second tergite slightly longer than wide; narrowed anteriorly, the sides curved, not striate basally; foveae short, not distinctly striate; between the foveae not sculptured; tergites three to six unsculptured, united three-fifths the length of the second; six as wide as long, sharply pointed apically; wings brownish as in *fuscipennis* Fouts, extending the length of the last four segments united past the apex of the abdomen. Body entirely dull rufous, the tarsi lighter.

Male.—Length 1.28 mm. Pedicel twice as long as wide, as wide as joint five, but longer, as long as ten; three a little longer than wide, less than half as wide as the pedicel, closely joined to four which is wider and shorter than the pedicel, widened apically, the sides curved, not emarginate; joints five to nine a little longer than wide, the ends rounded; pronotum not so extensively shagreened as in the female; abdomen long, egg-shaped, as long as the head and thorax united, as wide as the thorax, not quite twice as long as wide, convex above and below; segments three to seven united one-third as long as the second; wings brownish, extending two-thirds the length of the second tergite past the apex of the abdomen. Legs somewhat lighter colored than in the female.

Type locality.—Martinez, California.

Type, and Allotype.—Cat. No. 25433, U.S.N.M. Paratype in Collection Fouts.

Described from two females and one male from Martinez, California, reared by Mr. H. W. Turner, January 6–23, 1863, from flower bud galls of *Isosoma* (?) on *Baccharis pilularis.*

The specimens are labled in T. Pergande's handwriting and the following is an extract from the notes on his cage 2964:

> Jan. 2, '83 Rec. to-day from H. W. Turner, Martinez, Calif., a lot of galls, which are the deformation of flower buds of *Baccharis pilularis*, produced as it seems by a species of *Isosoma*, as no Cecid. larvae were found in all which were examined; however, they may prove to be only parasites. Several of the single galls are mostly grown

together into a compact mass which sometimes is quite globular, mostly, however, each gall is quite distinct. They are of a soft, white spongy texture inside and contain several cylindrical elongated cells. When fresh the color of the galls externally is purplish and pale yellowish green. The larvae are white and dorsally and ventrally beset with stiff bristles which enables them to move back and forward in their cell quite easily. Some larvae are mounted on slide 3/1/105; the rest are placed in jar to breed. Coll. Dec. 12, '82. Jan. 6, '83, one Proctotrypid issued to-day. Jan 20, '83 two Proctotrypids issued to-day.

18. PLATYGASTER WEBSTERI, new species.

Female.—Length 2 mm. Head twice as wide as long, oblong, excavated behind, slightly wider than the thorax, full behind the eyes, entirely shagreened and shining (except immediately above the antennae where it is strongly transversely striate); cheeks strongly convex, as wide as the eyes; pedicel slightly over twice as long as wide, as wide as joint five, a little wider than four, shorter than three and four united; three longer than wide, half as long as two, narrower than four; four three-fourths as long as two, as long as five; joints six to nine a little longer than wide, wider than five; ten blunt at apex, the sides parallel; thorax two-thirds as wide as long, subconvex above, a little higher than wide; pronotum finely shagreened laterally; mesonotum strongly shagreened, the lateral lobes polished outwardly; notauli complete, deeply marked; median lobe sharply pointed apically; scutellum circular seen from above, convex, shagreened, sparsely pubescent; metapleurae, propodeum, hind coxae, first tergite laterally and apically, first sternite, second basally, and second tergite in the basal foveae, densely covered with white pubescence; abdomen broadly elliptical, twice as long as wide, a little wider than the thorax, as long as the head and thorax united, pointed apically; first tergite excavated on the sides, the median area longer than wide, with an incomplete median carina; second a little longer than wide, not much narrowed basally, the sides nearly straight; basal foveae deep and wide, unsculptured, with long pubescence at their bases; median area with raised border, unsculptured; tergites three to six polished, united half as long as the second; three and four equal in length, five longer; six as long as five, wider than long, pointed apically; wings slightly tinged with brown, extending three-fifths the length of the second tergite past the apex of the abdomen; ovipositor sometimes slightly exserted. Shining black; antennae piceous, hind coxae black; legs uniformly dark brown.

Type locality.—Wooster, Ohio (?).

Type.—Cat. No. 25434, U.S.N.M. Two paratypes in Collection Fouts. Described from four females labeled, "On grass, Webster, May 19, 1886." No locality is mentioned and I doubtfully suggest the above, Professor Webster having been in Wooster working on entomology about that time

This beautiful species is easily recognized, the color of the wings and the shape and sculpture of the abdomen being characteristic.

19. PLATYGASTER HYALINIPENNIS (Ashmead).

Isorhombus hyalinipennis ASHMEAD, Can. Ent., vol. 19, 1887, p. 129, female.—CRESSON, Syn. of Hym., 1887, p. 249.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 276, pl. 12, fig. 2, male.

Female.—Length 1.50 mm. Head transverse, twice as wide as long, a little wider than the thorax, rather full behind the eyes; head mostly shagreened; frons finely shagreened, moderately striate just above the insertion of the antennae; vertex separated from the occiput by a blunt ridge; antennae long and slender, the flagellum gradually increasing in thickness toward tip; last three joints somewhat thicker than the others, black; joints eight and nine transverse; ten longer than wide, blunt apically; thoracic ratio; length 25 (0.555 mm.), width 17, height 19; mesonotum subconvex, shagreened, shining, notauli distinct to the middle of the mesonotum, strongly diverging anteriorly; median lobe narrowed apically, rounded, nearly touching the scutellum; scutellum convex, shagreened, with high margins laterally, sparsely pubescent on the sides; dorsal plate of the scutellum turned upward slightly at apex, forming a small tubercle; the length of the abdomen is to the length of the thorax as 30 is to 25; abdomen spatulate, almost two-thirds as wide as long, sharply pointed apically, more strongly pubescent on the first tergite and the second at base, laterally and ventrally; second tergite about as wide as long, without sculpture (except on the inner sides of the short basal foveae, where it is striate); segments three to six united a little less than half as long as the second, polished and shining; last segment triangular, broadly transverse, acute at apex; abdomen widest at the apex of the second segment, the sides anterior and posterior to this point straight, forming a continuous line; first segment half as wide as the second at apex; legs rather long and slender, the hind femora reaching to the apex of the second abdominal tergite; wings hyaline, without cilia, reaching far past the apex of the abdomen.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25435, U.S.N.M.

Thetype and paratype were studied in drawing up the description. A female paratype in Ashmead's type series belongs to a different species (in *Leptacis*) as yet undescribed. The male described by Ashmead (1893) is a different and new species belonging to the genus *Platygaster* but is in poor condition for description.

This species represents another extreme in the genus *Platygaster*. The antennal color pattern is unique and the tubercular scutellum, while not unique, is certainly very extraordinary.

20. PLATYGASTER ALNICOLA (Ashmead).

Polymecus alnicola Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 283.—Brues. Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 535.

Female.—Length 2 mm. Head shaped as in *pallipes* Ashmead; face not elevated in middle; occiput, vertex, most of cheeks, interocellar area, and face around the ocelli strongly shagreened, much as in *pallipes;* rest of face finely shagreened, without well marked transverse striae above antennal sockets; antennal process truncate anteriorly, the sides only slightly ridged; antennae moderately slender, the joints, except the scape, combined about equal in length to the thorax; scape thickened subapically, a little shorter than the five succeeding joints united, pedicel slightly over twice as long as wide, about as long as the two following joints united, a little wider than the fourth; third joint as wide as long, narrowed basally, as wide as the fourth, half as long as the fourth; fifth and sixth about as long as the fourth, a little thicker, seventh nearly as long as and considerably thicker than the second; eighth and ninth distinctly but not much longer than wide, slightly shorter than, but as wide as, the seventh; tenth joint oblong-oval, as long as the second, twice as long as wide; a little narrower than the ninth, obtuse at tip; thorax twice as long as wide; pronotum shagreened on the sides of the median area; notauli complete; median lobe of mesonotum rather strongly shagreened, the two lines on anterior third narrow and depressed, not very distinct; lateral lobes shagreened anteriorly along their inner margins, and along their outer margin to apical half, otherwise polished; scutellum transverse, highly convex, margined laterally, shagreened and with a few short white hairs on the sides; metapleurae, propodeum, first tergite laterally, and second tergite at extreme base in the foveae, sparsely covered with short white hair; abdomen a little longer than the head and thorax united, as wide as the thorax, shaped somewhat as in *pallipes* but shorter than in that species; segments one and two united as long as the thorax; median area on first tergite quadrate, the dorsolateral ridges sharp and rather prominent; second tergite about as long as wide apically, somewhat narrowed basally, the sides feebly curved; basal foveae broad and deep, covered with strong striae which radiate fan shaped nearly two-thirds the length of the segment from the base; area between the foveae with a few short striae laterally; third tergite four times wider at base than long, three-fifths as long as the fourth the sides oblique; fourth tergite twice as wide at base as long, the sides oblique, straight, continuing the sides of the third; fifth as wide at base as long, the sides not quite as oblique as those of the two preceding segments; last segment as long as the fourth, one and one-half times as long as wide, acutely pointed apically; front wings extending to the apex of the fifth segment, hyaline, covered thickly with short pubescence. Black; antennae and last joint of each tarsus uniformly dark brown; legs reddish brown, the front tibiae, middle and hind tibiae at base, and tarsi, tinged with yellow.

Male.—Length 1.70 mm. Pedicel twice as long as wide, narrowed proximally; third joint one-third as long as the second and much narrower, closely jointed to the fourth; fourth a little shorter than, but conspicuosly thicker than the second, not as thick as in *pallipes*, indistinctly emarginate proximally; joints four to nine, inclusive, seen laterally slightly but distinctly longer than wide; ten conical, pointed, distinctly longer than the second; abdomen slightly shorter than the head and thorax united, about as wide as the thorax, twice as long as wide, broadly rounded apically, not much narrowed basally; front legs a little lighter than in the female, yellowish, the femora medially brownish; antennae dark brown.

Type locality.—District of Columbia.

Type.—Cat. No. 24602, U.S.N.M.

Redescribed from the types in the United States National Museum. They were reared April 30 and May 1, 1884, from a Cecidomyid gall, *Cecidomyia serrulata* Osten Sacken found on alder. This species with its moderately short abdomen in the female is intermediate between such forms as *vancouverensis* Ashmead and *herrickii* Paskard.

21. PLATYGASTER SHASTENSIS, new species.

Female.—Length 2.50 mm. Body flattened, rather broad seen from above; head viewed dorsally a little over twice as wide as long, emarginate behind, the cheeks rather full; frons feebly convex; occiput, cheeks (except near the eyes), and vertex (with the exception of a feebly striate area just behind the ocelli), strongly shagreened, much as in *vancouverensis*; upper part of frons more finely shagreened, traversed longitudinally by a median unsculptured furrow; face below middle of eyes finely transversely striate, the striae rather distant from one another; antennae long and slender; scape long, slightly curved basally, shagreened dorsally, not quite as long as the next four joints united; pedicel thrice as long as wide, not much narrowed basally; fourth joint equal in width to the third, one and one-half times as long as the third, narrower than the second, about four times as long as wide, the sides parallel; joints five to nine, inclusive, equally long, five narrower, a little wider than the fourth; joints six to nine about three times as long as wide, equally wide; joint ten three times as long as wide, acutely pointed, widest proximally, the sides oblique; thorax more or less flattened above, a little wider than high; anterior face of pronotum perpendicular, hardly visible above, distinctly shagreened along the upper edge; pronotum polished laterally, unsculptured; mesopleurae unsculptured, with the median furrow rather deep; notauli complete, meeting in a rounded point which touches the scutellum; median lobe of mesonotum with two short, prominent, longitudinal ridges anteriorly and a distinct median longitudinal furrow extending from its anterior border to its apical third, shagreened in this furrow and toward the apex; lateral lobes very slightly shagreened in their inner posterior corners, otherwise polished, hairless; scutellum transverse, flattened, margined laterally, polished (except on sides where it is faintly shagreened), from the middle sloping abruptly posteriorly to the propodeum; metapleurae, propodeum laterally, first tergite sparsely on the sides, and basal foveae proximally, covered with short white hair; abdomen twice as long as the head and thorax united, broad and very much flattened, the second tergite distinctly wider than the thorax across the tegulae; first tergite a little over twice as wide as long; median area quadrate, elevated, the dorsolateral ridges sharp and prominent, elevated anteriorly and posteriorly, a longitudinal carina traversing the depression but not attaining either end of the segment; second tergite three-fifths as wide at apex as long, not much narrowed basally, the sides on apical half nearly parallel, very slightly curved, anteriorly abruptly curved; basal foveae short and deep, with a few faint striae confined within their borders, the space between the foveae with a few faint striae half their length; abdomen beyond the apex of the second segment gradually narrowing to tip; third tergite as long as wide at base, slightly narrower posteriorly, the sides straight; fourth as long as wide at apex, a little broader basally, half as wide through the middle as the second tergite apically; fifth two-thirds as wide as long, the sides parallel, a little narrower than the fourth medially; six as long as the fifth, as wide as long, sharply pointed apically, unsculptured, with a fringe of hairs laterally; wings hyaline, extending to apex of fourth segment. Black; legs and antennae piceous.

Type locality.—Palmerlees Ranch, Oregon.

Type.—Cat. No. 25436, U.S.N.M. Paratype in Collection Fouts.

Described from two female specimens from Palmerlees Ranch, Oregon, reared by J. E. Patterson, September 8, 1915, from the cones of *Abies shastensis*, and recorded in the Bureau of Entomology under Hopkins U. S. No. 14200*m*.

The species is probably parasitic on some Cecidomyid inhabiting the cone.

The extraordinary flatness of the body and the peculiar structure of the mesonotum serve to distinguish the species from closely allied ones.

22. PLATYGASTER LUCIDA, new species.

Female.—Length 2 mm. Shape of body somewhat similar to that found in the females of *shastensis*, the abdomen just as flat as in that species but the thorax less depressed, higher than wide; head rather finely shagreened, more finely on the frons just above the antennae where it is smooth, not distinctly striate; head shaped as in *shastensis*, the vertex rounded; median impression below anterior ocellus distinct but very shallow, not so deep as in *shastensis;* antennae very long and slender; scape extremely elongate, narrowed basally and not much thickened distally; pedicel about four times as long as wide at apex, club-shaped; third joint a little over thrice as long as wide, very slender, less than half as wide as the second at apex, a little over half as long as the second; fourth about four times as long as wide at apex, narrower at base, distinctly narrower at apex than the second; fifth about as long as the second, as wide as the fourth; joints six to ten, inclusive, a little less than thrice as long as wide, wider medially, the last joint rather sharply pointed apically, the sides on basal two-thirds approximately parallel; pronotum as in *shastensis;* mesonotum convex; notauli complete; median lobe shagreened, gradually becoming smooth toward apex where it is sharply pointed; lateral lobes shagreened only along the inner margin, polished otherwise; scutellum transverse, margined laterally, highly convex, polished in the middle, shagreened laterally; metapleurae and propodeum on the sides sparsely covered with short grayish hairs; first and second tergites without pubescence; abdomen strongly flattened, one and one-half times as long as the head and thorax united, much wider than the thorax; first tergite twice as wide as long, the median area subconvex, elevated, but with the dorsolateral ridges rounded, inconspicuous; second tergite distinctly wider at apex than long, narrower basally; basal foveae deep and broad, with faint striae on their inner slopes; area between them with a few short striae; tergites beyond the second broadly tranverse, becoming gradually narrower toward apex; six as wide as long, sharply pointed apically, the sides straight; wings tinged with brown, extending nearly the length of the last three segments past the apex of the abdomen. Black, antennae and legs piceous, the anterior tibiae apically and all tarsi somewhat lighter, tinged with yellow.

Type locality.—Mount View, Colorado.

Type.—Cat. No. 25437, U.S.N.M. Paratype in Collection Fouts.

Described from two female specimens from Mount View, Colorado, reared by J. H. Pollock, September 5, 1916, from cones of *Picea engelmanni* and recorded in the Bureau of Entomology under Hopkins U. S. No. 14284*b*. Specimens belonging to the genus *Laspeyresia* and also some unidentified Diptera were reared from the same galls. It is probable that *lucida* is parasitic on the Diptera (Cecidomyids), inhabiting the cones.

23. PLATYGASTER GAHANI, new species.

Female.—Length 2.50 mm. Habitus of *lucida* Fouts; the abdomen, however, not so strongly flattened, the second sternite distinctly, but not extraordinarily swollen; head in shape and sculpture very similar to that of *shastensis*, but with the transverse striae above and to the sides of antennae finer, more indistinct and wavy; antenna extremely long, the flagellum longer than the thorax, all the joints much longer than wide; scape reaching above lateral ocelli, not much curved basally and only slightly swollen apically, a little shorter than the four following joints united: pedicel slightly over thrice as long as wide near the apex, nearly one-third as long as the scape but much narrower, considerably wider than any of the following joints which are subequal in width; third joint about two-thirds as long as the fourth, a little over three times as long as wide, very slightly but distinctly narrower than the fourth; joints four to ten inclusive subequal in length and width, about four times as long as wide, the sides parallel; joint ten bluntly pointed apically, the sides parallel nearly to tip; thorax in shape, sculpture, and pubescence as in *lucida* but the median lobe of mesonotum not at all sculptured on apical third; abdomen distinctly but not much wider than the thorax, slightly less than three times as long as wide, broadly elliptical in shape; first tergite twice as wide as long, its anterior edge highly elevated, shaped as in *lucida*, the median area with a carina apically; second tergite with its sides slightly curved, the width to the length as twenty is to twenty-three; basal foveae deeper than in *lucida*, strongly striae all over, the striae extending almost to the middle of the segment; tergites three to six, inclusive, about equal in length, the sides straight and slanting posteriorly at an angle of about 45° from a line drawn down the middle of the abdomen; last tergite as wide as long, pointed apically; none of the tergites sculptured, except the second as mentioned above; length of abdomen to length of thorax as five is to four; wings hyaline, reaching to, but not beyond, the tip of the abdomen. Shining black; legs and antennae piceous.

Type locality.—Quincy, California.

Type.—Cat. No. 25438, U.S.N.M. Two paratypes in Collection Fouts.

Described from four specimens reared by F. P. Keen, September 20, 1915, from cones of *Abies concolor*, and recorded in the Bureau of Entomology under Hopkins U. S. No. 14201*m*. The type specimens of *Laspeyresia pallidibasalis* Heinrich were reared from these cones and recorded under the same number but have probably no connection with the present species.

P. gahani is especially remarkable because of the peculiar structure of the antennae, joints four to ten being subequal in length and width. This peculiarity is approached but not quite attained in *lucida* Fouts. The males of *gahani* and *lucida* can not be distinguished by any character mentioned above. When they are found they will probably have to be determined by being definitely associated with the females.

This species is named after my friend and colleague, Mr. A. B. Gahan.

24. PLATYGASTER MELANOCERA (Ashmead).

Synopeas melanocerus ASHMEAD, Can. Ent., vol. 19, 1887, p. 130.—CRESSON, Syn. of Hym., 1887, p. 249.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 289.
Platygaster gracilis ASHMEAD, Can. Ent., vol. 19, 1887, p. 132.—CRESSON, Syn. of Hym., 1887, p. 250.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 326.

Male.—Length 1.84 mm. Head shaped as in *P. rohweri* Fouts; occiput and vertex more finely shagreend than in *rohweri;* interocellar area and region around ocelli shagreened, more finely than on occiput and vertex; frons (except on sides above where it is shagreened) shining, very finely aciculate, with a few transverse aciculae just above bases of antennae; malar space shagreened; antennae stout but rather long, all the joints, except the third, considerably longer than wide; pedicel two and one-half times as long as wide, tapering from the middle proximally, as long as the fifth joint but not so wide and not so thickly pubescent; third joint as long as wide, closely joined to the fourth; fourth as long as fifth and as thick as the scape at the latter's thickest part, slightly emarginate basally and about one and one-half times as long as wide; joints five and six subequal in length and width to seven, eight, and nine, about twice as long as wide; thorax about as high as wide, in structure and sculpture as in *rohweri* except that the scutellum is not quite so shining, distinctly shagreened medially; pubescence on thorax and first and second tergite as in *rohweri;* first tergite a little less than twice as wide as long, not strongly striate anywhere, median area slightly elevated entirely and basally elevated along the anterior edge, without a median carina; abdomen about as long as the head and thorax united, slightly narrower at apex of second tergite than the thorax across the tegulae, highly convex above and below, more than half as high as the thorax, seen from above broadly elliptical in outline; second tergite about one and one-half times as long as wide, narrowed basally; basal foveae distinct, not very deep, rather strongly striate, the striae numerous and extending fan-shaped to the middle of the segment; space between foveae with a very short median carina; segments beyond the second short, becoming narrower toward apex; last segment perpendicular; wings hyaline, rather thickly pubescent, extending the length of the terminal four segments past the apex of the abdomen. Shining black; mandibles basally, antennae, tegulae, coxae, middle and hind femora (except at extreme bases), middle hind tibiae on the outside, and last joint of each tarsus, dark brown to piceous; remaining parts of appendages stramineous with slight variations.

Type locality.—Jacksonville, Florida.

Type. —The type of *melanocera* is lost.

Type of gracilis.—Cat. No.24603, U.S.N.M.

Redescribed from the male determined by Ashmead and described by him in his Monograph (p. 289). I have been unable to find the female type in the collection but the original description makes it clear that the type was a female. The shape of the abdomen is the distinguishing character of the species, being remarkably narrow, and convex above and below. *Platygaster gracilis* Ashmead I cannot seperate from this species. The legs and tegulae are slightly darker and the seventh joint of the antennae is distinctly emarginate below on basal half. This latter character I believe to be an aberration and color characters are too unstable to be of any value. The last joint of one antenna and the last six joints of the other are lost from the type of *gracilis*. Otherwise it is in good condition.

25. PLATYGASTER DIPLOSIDIS (Ashmead).

Polygnotus diplosidis Ashmead, Bull. 45, U S. Nat. Mus., 1893, p. 306.—Brues, Bull. 22, Conn. Geol. Nat. Hist Surv., 1916 (1917), p. 540.

Polygnotus pinicola Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 307.—Brues, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 539.

Female.—Length 1.2 mm. Body rather short and stout; head seen from above a little over twice as wide as long, flattened behind. convex in front; occiput aciculate; cheeks behind finely shagreened; vertex transversely striate, with a transverse median carinae, finely shagreened laterally; ocellar triangle and extreme upper part of face on sides faintly shagreened, the rest of the face finely aciculate, not striate anywhere; antennae stout; flagellum shorter than the thorax, gradually incrassated toward tip; scape short, slightly curved basally, not much thickened before the apex, about as long as the next five joints united, as wide as any of the last four joints; pedicel distinctly less than twice as long as wide, narrowed but not curved proximally, as wide apically as the sixth, a little longer than the seventh; third and fourth joints equal in length and width, as long as wide, closely joined, much narrower than, and half as long as, the second; five about as wide but a litte longer than four, about as long as but narrower than six; six a little narrower and shorter than seven, eight or nine which are subequal in width and length, each as long as wide; ten longer than the pedicel, nearly as wide as nine, one and one-half times as long as wide, blunt apically; thorax very short, strongly convex above, as wide as high, less than one and one-half times as long as wide seen from above, as wide as the head; pronotum finely aciculate to shagreened (except medially above and a narrow line posteriorly on the sides where it is polished); longitudinal ridges not well defined, the median area therefore not definitely bounded, faintly shagreened; mesonotum strongly convex, separated from the scutellum by a deep furrow, without notauli; scutellum transverse, very highly convex, unsculptured, subacute at top, the posterior face encroaching upon the anterior, with a distinct, though shallow and broad, longitudinal grove down the center; metapleurae, propodeum, and first sternite sparsely covered with moderately long greyish hair; abdomen as long as the thorax, slightly narrower, about twice as long as wide, spatulate, subacute at tip, short behind the second segment; first tergite about three times as wide as long, hairless; median area as wide as long, traversed longitudinally by a few carinae; dorso-lateral carinae on first tergite obsolescent; second tergite a little wider at apex than long, narrower basally, the sides near apex curved; basal foveae deep and broad, finely striate, the striae extending to the middle of the segment; area between the foveae with a few carinae; segments three to six inclusive united three-fourths as long as the second, abruptly narrowing to apex; tergites three, four, and five equal in length; six longer, nearly twice as wide as long, triangular in outline, subacute at tip: wings hyaline, extending the length of the last three tergites past the apex of the abdomen. Dark amber colored, the appendages uniformly brown.

Male.—Length 1 mm. Antennae stout; pedicel one and one-half times as long as wide, widest at middle; third joint very narrow, as wide as long; fourth a little shorter than second, wider apically than second, its apex produced outwardly, seen from above twice as wide as at base; joint five subequal in length and width to the fourth; five to nine equally wide, a little longer than wide, as long as the pedicel; ten as long as three and four united, as wide as but longer than the pedicel, conic-ovate; abdomen short, broad, less than twice as long as wide; wings extending a little over half the length of the abdomen past its apex. Legs sometimes touched with yellow.

Type locality.—New Brunswick, New Jersey.

Other localities.—District of Columbia, Montana, Massachusetts, North Carolina.

Type.—Cat. No. 2282, U.S.N.M. Type selected.

Redescribed from the type series, four females, in the United States National Museum. My description of the male is based on specimens in the type series of *pinicola* Ashmead. The types were reared February 12, 1891, by Prof. J. B. Smith from a Cecidomyid, *Diplosis*, species, found on pine. The types (Cat. No. 2283, U.S.N.M.) of *pinicola* Ashmead were reared, May 14 1879, from *Cecidomyia pini-inopsis* Osten Sacken, found on pine needles. I have examined two series of this species from the Division of Forest Insects, Bureau of Entomology, and recorded under the numbers, "Hopk. U. S. 11080*o* and 9910*i*." The former series consists of seven specimens from Missoula, Montana, reared by D. T. Harvey, November 8, 1915, from a Cedidomyid found on *Picea engelmanni*. There is also under this number a vial containing many specimens. The other series consists of seven specimens from Islington, Massachusetts, reared May 20, 1915, from pine twigs. Pitch and white pine are mentioned in the notes, but I do not know which has connection with the *Platygasters*. I also have another series of six specimens from Tryon, North Carolina, reared from pine and recorded in the Bureau of Entomology under Hopk. U. S. No.1483*c*.

This species is a very interesting one. It is unique among our species in having the notauli absent. The peculiar structure of the scutellum recalls abberational forms of *P. vernalis* Myers, and it may be that forms will be found with the scutellum deeply notched. I have found some variation in color. The types are dark amber colored, while much of the more recent material has the body shining black.

26. PLATYGASTER ERROR Fitch.

Platygaster error Fitch, Sixth N. Y. Rep., p. 76, pl. 1, fig. 4.
Anopedias error Fitch, Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 291.—Brues, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 533.

Female.—Length 1.22 mm. Body polished, without definite sculpture; head a little wider than the thorax, not quite twice as wide as long, scarcely emarginate posteriorly; frons polished; low ridge separating vertex from occiput shagreened, otherwise head is without sculpture; antennae slender, considerably longer than the head and thorax united; pedicel twice as long as wide, as long as the two following joints united; fourth joint twice as long as the third, as long as the fifth, not quite twice as long as wide; sixth joint as long as the fifth, indistinctly wider; seventh, eighth, and ninth joints slightly longer and wider, subequal in length and width; tenth as wide as ninth, a little longer; thoracic ratio: length 21 (0.466 mm.), width 14, height 16; mesonotum subconvex; notauli deep, nearly parallel, widely separated and curving outwardly in front of the scutellum; scutellum a trifle longer than wide, polished, sparsely pubescent, evenly convex; scutellum separated from the mesonotum by a deep, narrow, impressed line, its surface on a level with that of the mesonotum; abdomen elliptical, slightly narrower than the thorax, a little over twice as long as wide, as long as the head and the thorax united; first segment finely fluted, not much wider than long, the dorsolateral ridges distinct; second tergite as wide as long, strongly narrowed anteriorly from its apex; foveae small, short, the striae short and continuous across the base of the segment; segments following the second polished, united not quite as long as the second; wings hyaline, with a rather long marginal fringe on both pairs. Black· antennae of a uniform dark brown color; legs brown, the tibiae and tarsi somewhat lighter.

Male.—Length 1 mm. Similar to the female in most respects. Pedicel twice as long as wide, as wide and as long as joint five; third joint as wide as long, narrower than the pedicel; fourth joint as long as the pedicel, and also as wide (except at apex where it is broadened and rather sharp on the outside); inside edge of fourth joint not appreciably curved; joints six to nine subequal, twice as long as wide, thickly covered with short white hairs; tenth joint as wide as the ninth, distinctly longer than joints three and four united; abdomen spatulate, rounded apically, narrower than the thorax, less than twice as long as wide.

Type locality.—New York.

Other localities.—Washington, District of Columbia; Arlington, Virginia; and Lafayette, Indiana.

Type.—Cat. No. 1840, U.S.N.M. Type female selected.

Described from Fitch's type material, six females and one male. Only one female is in good condition. I could not even decide whether the male really belongs to this species. The type of my description of the male is a specimen reared by Prof. F. M. Webster from *Diplosis tritici*.

27. PLATYGASTER COMPRESSIVENTRIS (Ashmead).

Polymecus compressiventris ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 282.

Female.—Length 3 mm. Head about twice as wide as long seen from above, emarginate behind, the cheeks wide; frons convex, with a short indistinct furrow below the anterior ocellus; vertex, interocellar area, frons on sides, very faintly shagreened, polished medially, just above the antennal process with a few faint transverse aciculae; antennal process short and broad, truncate, the anterior edge not raised; "pedicel oval, not quite as long as the first and second funicular joint united; first funicular joint narrowed, but twice as long as thick; the second stouter, obconic; third and fourth about equal, obconic, but longer than the second; the three following joints bell-shaped, loosely joined, the last conical, longer than the preceding"; thorax about as high as wide, slightly flattened above; a narrow, vertical band medially placed on the pronotum shagreened; central area of pronotum unsculptured (except at edges where there are a few striae), wider below, the ridges curved outwardly below and inwardly above; notauli complete, meeting in a sharp point posteriorly; median lobe of mesonotum shagreened, polished posteriorly; lateral lobes shagreened on a wide band along the sides of the notauli; scutellum transverse, considerably flattened; margined laterally, polished and unsculptured, with a few fine hairs on the sides; metapleurae and pronotum laterally covered with short pubescence; first tergite sparsely pubescent laterally, a little less than twice as wide as long, its anterior edges highly elevated, the median area quadrate, with an indistinct central carina on its posterior face; length of abdomen to that of head and thorax united as seven and one-half is to three; abdomen extraordinarily flattened, looking as thin as a sheet of paper when viewed from the side, at the middle of second segment three-fifths as wide as the thorax across the tegulae; second tergite two and one-half times as long as wide, as wide at base as at apex, widest just before middle; basal foveae very short, indistinct because covered with short white hair, with striae not extending beyond their margins; apex of the second tergite broadly rounded, semicircular as are the apices of all the tergites (except the terminal one), the sides curved; third tergite two-thirds as long as the second, twice as long as wide at base, the sides nearly parallel, diverging very slightly anteriorly; fourth tergite two-thirds as long as the third, twice as long as wide, as wide as the third at apex, the sides parallel; fifth two-thirds as long as the fourth, one and one third times as long as wide, as wide as the fourth, the sides parallel; last tergite as long as the fifth, pointed apically, the sides straight; wings hyaline. Reddish brown; antennae, palpi, and legs golden yellow; "the flagellum slightly infuscated toward tip."

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 24604, U.S.N.M.

Redescribed from the type specimen in the United States Natioal Museum. The antennae and interior wings were lost before I saw the type.

A remarkable form. The extraordinarily flat abdomen and the peculiar structure of the apices of the tergites serve to distinguish the species.

28. PLATYGASTER FILICORNIS (Ashmead).

Polygnotus filicornis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 321.

Female.—Length 1.5 mm. Body rather short and stout; head seen from above about twice as wide as long, the cheeks rather full; occiput excavated, margined; occiput, vertex, and cheeks behind, shagreened; interocellar area and extreme upper part of frons on sides more finely shagreened; frons laterally very faintly aciculate, below on sides with a few faint transverse striae, otherwise polished, unsculptured; antennae long and slender, gradually incrassated toward tips, the flagellum about as long as the abdomen, all of its joints longer than wide; pedicel nearly three times as long as wide at apex, slightly narrowed proximally; third joint twice as long as wide, the sides parallel, about half as long as the second, a little over half as long as the fourth; fourth two and one-half times as long as wide, very slightly narrowed proximally, narrower than the second; joints five and six about twice as long as wide, as wide as the pedicel and as long as the fourth; joints seven to ten, inclusive, thicker, about twice as long as wide, the last ovalo-conical; thorax short, thick, about as wide as high, approximately two-thirds as wide as long, moderately convex; pronotum as in *compressiventris*, but the median area wider above than below, not sculptured; notauli complete, meeting in a rounded tip posteriorly; median lobe shagreened, polished posteriorly, without the two anterior ridges; lateral lobes mostly polished, with a narrow shagreened band inwardly; scutellum transverse, strongly convex, margined laterally, polished, the anterior angles finely shagreened; abdomen about as long as the head and thorax united, as wide as the thorax, broadly elliptical, about twice as long as wide, flattened above, convex below; first tergite about twice as wide as long, slightly elevated anteriorly, rounded above, the median area narrow and not well defined; second tergite about a fourth longer than wide, a little over half as wide anteriorly as posteriorly, the foveae distinct, deep, without pubescence at base, the striae numerous, moderately fine, and extending slightly beyond the apices of the foveae; tergites three and four about equal in length, the former wider, the sides of both oblique; fifth half as long as the fourth, narrower; sixth triangular, pointed apically, as long as the third; wings subhyaline, extending slightly beyond the apex of the abdomen. Black; antennae and legs shining brown, the tibiae and tarsi a little lighter.

Male.—Length 1.5 mm. Abdomen distinctly longer and narrower than the thorax, subconvex above, more highly convex below, obvate, broadly rounded posteriorly, a little over twice as long as wide; last tergite perpendicular; wings extending about half the length of the abdomen past its apex.

Type locality.—District of Columbia.

Type.—Cat. No. 24605, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, three females and one male. The females are in good condition. The male, however, has the head and most of the legs missing. Ashmead merely mentioned the male in his description so I am unable to give any further particulars in regard to its missing parts. The distinguishing features of this species are the short thorax in both sexes and the long antennae in the female.

29. PLATYGASTER COLORADENSIS (Ashmead).

Polygnotus coloradensis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 320.

Female.—Length 1.2 mm. Head shaped as in filicornis; occiput, vertex (more finely medially), and cheeks behind, shagreened; frons finely aciculate above on the sides, finely diagonally striate to the sides of the antennal sockets, otherwise polished; interocellar area very finely shagreened; thorax shaped as in *filicornis*, more finely sculptured however, the lateral lobes of the mesonotum polished; scutellum not quite so strongly convex as in *filicornis*, otherwise identical in shape and sculpture; metapleurae, propodeum laterally, first tergite and sternite (the former laterally), and second tergite and sternite basally (the former in the foveae), densely covered with rather long silvery pubescence; abdomen about as long as the head and thorax united, broadly elliptical, as wide as the thorax, the segments behind the second proportionately shorter than in *filicornis;* first tergite a little over twice as wide as long, the anterior and posterior edges moderately elevated; median area well defined, with several indistinct longitudinal carinae (sometimes none); second tergite as wide apically as long, narrower basally, the sides curved; foveae broad, short, moderately deep, unsculptured, the area between them narrow, with a short median carina; terminal segments as in *filicornis;* wings hyaline, extending the length of the last three segments past the apex of the abdomen. Black; antennae and legs brown, the front tibiae and all tarsi (except the last joint of each) tinged with yellow.

Male.—Length 1.2 mm. Pedicel less than twice as long as wide medially, swollen; third joint half as long as the fourth, as wide as long, slightly narrower than the fourth; fourth about one and one-third times as long as wide, narrower than the pedicel, not much emarginated basally; following joints to the tenth subequal in length and width, about one and one-half times as long as wide; joint the longer than the second, conical, pointed, widest at the base, the sides nearly straight; abdomen shorter than the head and thorax united, conex above and below, shaped as in the female, except that segments three to ten are relatively shorter; wings extending the length of the terminal six segments past the apex of the abdomen.

Type locality.—Fort Garland, Colorado.

Type.—Cat. No. 2301, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, three females and two males. One of the females has the antennae lost; otherwise the types are in perfect condition. According to Ashmead these specimens were reared June 25, 1883, from a Cecidomyid gall on sage bush, collected by L. Bruner. They bear the number "3120*o*, June 18–25, 1883."

The carinae between the abdominal foveae are subject to variation. In one female they are numerous and extend a little beyond the apices of the foveae. Usually they are few, two or three, and do not reach beyond the foveae.

30. PLATYGASTER CALIFORNICA (Ashmead).

Polygnotus californicus Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 321.

Female.—Length 1.5 mm. Very close to *coloradensis*, identical except in a few particulars; the anterior edge of the first tergite not at all elevated, the median area polished, without a central carina;

second tergite about as long as wide; basal foveae as in *coloradensis*, with or without faint striae on their inner slopes, with a few hairs basally; area between foveae with or without a few fine striae; abdomen about two and one-half times as long as wide, a little longer than the head and thorax united; segments three to six inclusive about of equal length, narrowing to the sixth, the sides of all straight and continuous; last tergite about as long as wide, pointed apically, with a row of short white hairs laterally; each of the tergites three to five traversed by a row of short white hairs; wings subhyaline sometimes brownish, extending slightly beyond the apex of the abdomen. Black; appendages colored as in *coloradensis* Ashmead.

Male.—Length 1.3 mm. Pedicel about twice as long as wide, twice as long and considerably wider than the third joint seen from the side; joint three a little longer than wide, closely joined to and about half as wide as the fourth; fourth joint a little shorter than the second, much wider, twice as wide apically as basally, slightly emarginate; joints five to nine, inclusive, equal in length and width, about one and one-third times as long as wide, a little wider than the pedicel; last joint as long as the third and fourth united, shaped as in *coloradensis*; abdomen shaped as in *coloradensis* but wider, distinctly wider than the thorax; wings infuscated, extending the length of the last six segments past the apex of the abdomen.

Type locality.—San Francisco and Alameda, California.

Type.—Cat. No. 2302, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, five females and eight males. These specimens were reared by A. Koebele, January 10 and 23, 1883, and July 16 and December 17 and 19, 1885, from a Cecidomyid gall found on *Baccharis pilularis*.

31. PLATYGASTER SOLIDAGINIS (Ashmead).

Polygnotus solidaginis ASHMEAD Can. Ent., vol. 19, 1887, p. 131.—CRESSON, Syn. of Hym., 1887, p. 250.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 307.

Polygnotus angulatus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 319.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 540.

Female.—Length 1.40 mm. Head twice as wide as long, not emarginate behind, flattened in front, more or less oblong seen from above, distinctly wider than the thorax; occiput and vertex striate as in *striaticeps* but usually more finely so; cheeks convex, nearly as wide as the eyes, aciculate-shagreened; projection of vertex broadly rounded, rather sharp, not extending far over the margin of the eye, its edge raised and the upper surface roughened; interocellar area finely shagreened; frons aciculate on the sides and below, with several striae above the insertion of the antennae; pedicel twice as long as wide, as long as joints three and four united, as wide as four; three a little longer than wide, narrower than four; five equal to four; six wider, slightly longer than wide; seven to nine wider than six, as wide as long; ten as long as the pedicel, sharply pointed apically, the upper side slightly curved; thorax three-fourths as wide as long, broadened and rounded anteriorly, convex above, as high as wide; pronotum aciculate; mesonotum shining, faintly shagreened on anterior half; notauli distinct on basal half, the median lobe rounded posteriorly; scutellum transverse, highly convex, polished, sparsely pubescent; abdomen elliptical, a little over twice as long as wide, narrower than the thorax, as long as the head and thorax united, pointed apically; first tergite strongly fluted, nearly perpendicular on the sides; dorsolateral ridges near the edge of the segment, the median area transverse, subconvex; second tergite a little longer than wide, not much narrowed anteriorly, the sides but slightly curved; tergites three to six unsculptured, equally long, united somewhat over half as long as the second; six a little wider than long, subacute; legs piceous; trochanters, all tibiae basally, anterior tibiae apically, and all tarsi (except the last joint of each); yellowish.

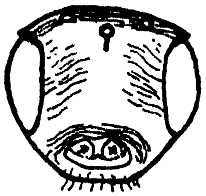

FIG. 6.—PLATYGASTER SOLIDAGINIS (ASHMEAD). HEAD OF FEMALE, FRONT VIEW.

The relative length of the abdomen is variable, due to the telescoping of the terminal segments. Sometimes it is as long as the head and thorax united and at other times scarcely longer than the thorax.

Male.—Length 1.30 mm. Projection of vertex somewhat less prominent than in the female; pedicle one-half longer than wide; third joint triangular, transverse, as wide as the pedicel, narrower than the fourth; four as long as the pedicel, widened and with a short projection below at apical third, rounded apically, not much longer than wide; joints five and six oval, one and one-half times as long as wide, narrower than four; seven to nine as long and indistinctly wider than five and six; ten as long as three and four united, pointed apically, the sides parallel nearly to the apex; abdomen a little longer and narrower than the thorax, not quite twice as long as wide; wings hyaline, extending one-third the length of the abdomen past its apex.

The coloration of the legs is variable. They may be mostly yellow (partly brown), or mostly black (partly yellow). One male has the abdomen as wide as the thorax, another as wide as the thorax and distended, as long as the head and thorax united.

Type locality.—Jacksonville, Florida.

Other localities.—Mount Holly Springs, Pennsylvania; Raleigh, North Carolina.

Type of solidaginis.—Cat. No. 24606, U.S.N.M. The female and allotype male selected.

Type of angulatus.—Cat. No. 25439, U.S.N.M. Type male selected.

Redescribed from the type series, eight females and three males. They were reared by Ashmead at Jacksonville, Florida, from *Cecidomyia nebulosa* Ashmead MS.

I have reared many specimens from black blister galls on *Solidago* collected in the valleys around Mount Holly Springs, Pennsylvania. The galls are numerous in June and July and the plants are spotted with them. A species of Eulophid was also reared from the galls.

The Museum contains specimens from Raleigh, North Carolina, reared April 11, 1902, from stem galls on aster and recorded in the North Carolina Department of Agriculture under Cat. No. 271.

The specimens Ashmead refers to[13] as having been reared by Doctor Riley at Bushberg, Missouri, were really reared by Theodore Pergande and are now the types of my new species *variabilis* hereinafter specifically described.

The specimens reared by Miss Murtfeldt from a gall on *Solidago* at Kirkwood, Missouri, also belongs to *variabilis*.

32. PLATYGASTER PLUTO (Ashmead).

Hypocampsis pluto Ashmead, Can. Ent., vol. 19, 1887, p. 131, female.—Cresson, Syn. of Hym., 1887, p. 250.—Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 298, pl. 12, fig. 10, female.

Female.—Length 1.50 mm. Head over twice as wide as long, not emarginate behind, flattened in front, wider than the thorax; occiput and vertex strongly transversely striate; vertex produced over the eyes, the projection long and narrowly rounded, seen from above extending to the outer margin of the eye, situated behind the middle of the head; cheeks flattened, shagreened; interocellar area finely shagreened; frons polished, unsculptured (except above the antennae where there are a few striae); pedicel twice as long as wide, as long as joints three and four united, wider than four; joint three as wide as long, half as long as four, narrower; five a little longer than four, one and one-half times as long as wide, as wide as four; six to nine a little longer than wide, oblong, wider than two; ten longer than the pedicel, over twice as long as wide, blunt at apex, the sides parallel; pronotum aciculate laterally; mesonotum shagreened, more finely so posteriorly; notauli briefly indicated, the median lobe broadly rounded posteriorly, projecting upon the scutellum; scutellum circular, highly convex, polished, sparsely pubescent laterally; abdomen broadly elliptical, as long as the head and thorax united, slightly wider than the thorax, a little less than twice as long as wide;

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[13] Bull. 45, U. S. Nat. Mus., 1893, p. 307

second tergite a little wider than long; basal foveae distinct, striate, the striae not reaching beyond the middle of the segment; tergites three to six unsculptured, united over half as long as the second; six wider than long, truncated apically; ovipositor exserted, the sheath as long as the second segment; wings subhyaline, reaching a little beyond the apex of the abdomen. Black; legs and antennae dark brown.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 24607, U.S.N.M.

Redescribed from the type. There are no ecological data connected with the specimen.

Ashmead's drawing of the type[14] is almost wholly at variance with the specimen supposed to have been figured as may be seen by comparing the former with the description written above. In the type the notauli are incomplete; the antennae are gradually incrassated toward tip; the abdomen is wider than the thorax and less than twice as wide as long. Moreover Ashmead does not mention in the description nor show in the drawing the peculiar structure of the vertex, the distinguishing character of the group to which the species belongs.

33. PLATYGASTER UTAHENSIS (Ashmead).

Polygnotus utahensis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 314.

Female.—Length 1.20 mm. Short and stout, with the appearance of some of the species of *Teleas;* head shaped as in *pluto* but not wider than the thorax, and with the projection more acute, situated over the posterior margin of the eye, in the middle of the head as seen from above; occiput and vertex posteriorly, transversely striate; cheeks strongly convex, aciculate-shagreened; interocellar area polished, unsculptured; frons faintly aciculate laterally, not striate below; joint three of antenna a little longer than wide, narrower and shorter than four; four not much longer than wide, as long as five but a little narrower; six as long and as wide as five, slightly longer than wide; joints beyond the sixth missing (all of them undoubtedly a little longer than wide); thorax three-fourths as wide as long, highly convex above, as wide as high; pronotum finely aciculate; mesonotum polished, unsculptured; notauli distinct on basal half, the median lobe truncated posteriorly; scutellum transverse, convex, highly polished, sparsely pubescent; abdomen as wide as the thorax, broadly ovate, a little over three-fourths as wide as long; first tergite angulate sublaterally, the median area quadrate, traversed by many longitudinal carinae; second tergite five-sixths as long as wide; basal foveae short, striate, the striae not reaching beyond their apices; area between the foveae with several carinae extending as far posteriorly as the striae; tergites three to six unsculptured, united one-third as long as the second; six very wide, several times as wide as long, rounded apically; wings hyaline, extending the length of the second tergite past the apex of the abdomen. Black; legs and antennae dark brown; tarsi lighter.

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[14] Bull. 45, U. S. Nat. Mus., 1893, pl. 12, fig. 10

Type locality.—Pariah, Utah.

Type.—Cat. No. 2291, U.S.N.M. Female selected as type. Male as allotype.

Redescribed from the type female. Ashmead mentioned a male in his original description. I have examined his male type and find it to belong to the genus *Leptacis*. It remains undescribed.

The type reared in July, 1881, from a Cecidomyid gall on *Artimesia 3-dentata.*

34. PLATYGASTER STRIATICEPS (Ashmead).

Polygnotus striaticeps ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893. p. 308.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 537.

Female.—Length 1 mm. Head twice as long as wide, oblong, as wide as the thorax, slightly emarginate behind, subconvex in front; cheeks convex, striate above, shagreened below; occiput and vertex strongly arcuately striate, the latter rounded above, projecting slightly over the middle of the eyes in a broadly rounded lobe; interocellar area transversely striate; frons aciculate, obliquely on the sides and transversely below; pedicel twice as long as wide, as long as joints three and four united, a little wider than four; joint three as wide as long, hardly narrower than four; four a little longer than wide, slightly longer than five, which is as wide as long; six much wider, as long as wide; joints seven to nine longer than wide, somewhat longer than six; thorax two-thirds as wide as long, convex above, as high as wide; pronotum faintly aciculate laterally; mesonotum shagreened on anterior half, polished posteriorly; notauli distinct on basal two-thirds, the median lobe narrowly rounded posteriorly; scutellum a little wider than long, convex, polished, sparsely pubescent; abdomen broadly elliptical, as wide as the thorax, a little less than twice as long as wide; first tergite regularly rounded above, with many longitudial carinae, not angulate on the sides; second tergite as long as wide, strongly narrowed anteriorly, the sides straight; basal foveae short, not reaching to the middle of the segment, striae reaching past the middle of the segment; between the foveae the anterior edge is raised and from it extend several short carinae; tergites three to six unsculptured, united half as long as the second; six wider than long, rounded apically; wings hyaline, extending the length of the last four segments past the apex of the abdomen. Body dark reddish brown (except the tarsi which are paler, dull whitish in color).

Male.—Length 1.10 mm. Pedicel a little longer than wide, as long and as wide as joint four; joint three as wide as long, two-thirds as long as four; four one and one-third times as long as wide, cylindrical, not widened toward the apex; joints six to nine about as long and as wide as four; abdomen ovate, as wide as the thorax, three-fifths as wide as long, rounded apically; segments three to seven united half as long as the second; wings hyaline, extending the length of the last five segments past the apex of the abdomen.

Type locality.—Newhall, Los Angeles County, California.

Paratype locality.—San Diego, California.

Type.—Cat. No. 2284, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, four females and three males. According to Ashmead six of these specimens were reared in July, 1886, by A. Koebele, from a Cecidomyid gall on an evergreen shrub (*Bigelovia* or *Artimesia*, species) taken at Newhall, Los Angeles County, California. There is also one female in the type series labeled as having been reared from *Aspidiotus* or *Bigelovia*, by the same observer at San Diego, California.

The males vary greatly in size, two being 0.60 mm. in length.

35. PLATYGASTER VERNALIS (Myers).

Polygnotus vernalis MYERS, Proc. U. S. Nat. Mus., vol. 53, 1917, p. 255.

This species seems to be extremely variable, not commonly so as in most other species, but in a most remarkable way. Messrs. Myers and McConnell have reared many specimens of *vernalis* from the puparia of the Hessian Fly and have found among them forms which have the scutellum divided into two lobes by a deep longitudinal furrow, and the mesonotum divided into six lobes by three furrows, one median and two oblique, the latter converging toward the scutellar fovea. The thorax is much shortened in these variants, being no longer than wide or even wider than long and flattened above, wider than the head. This variation is not confined to one sex. Of the ten specimens in the Museum showing such variation, seven are males and three females. All stages of transition are illustrated in this series of ten specimens. When the variation is slight only the scutellum is affected and is divided by a furrow. The mesonotum is next affected and is divided first by a median furrow and later by two oblique ones.

All of the specimens recorded are from the Eastern States—Pennsylvania, Maryland, Virginia and West Virginia. The type and allotype are from Hagerstown, Maryland, and bear the National Museum Cat. No. 21135. I have recently received a number of specimens of *vernalis* collected by W. H. Larrimer in various parts of Ohio and Indiana. Several of them were observed in April ovipositing in the eggs of *Phytophaga destructor* Say.

26. PLATYGASTER VITICOLA (Ashmead).

Polygnotus viticola ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 313.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 527.

Female.—Length 1.9 mm. Head twice as wide as long, not at all excavated behind, the cheeks straight, oblique; occiput strongly striate, the striae curved; cheeks striate (except narrowly anteriorly where they are unsculptured); vertex subacute, striate on the sides and smooth medially; interocellar area finely shagreened; frons covered with extremely closely placed obliquely directed aciculae; antennae stout, the flagellum (including the pedicel) a little shorter than the thorax; club joints wider than long; thorax about three-fourths as wide as long; pronotum shagreened above on the sides, below finely aciculate, polished posteriorly; median area wider than long, narrowed posteriorly, finely shagreened in front and polished behind; mesonotum convex, finely shagreened all over, less distinctly so on lateral lobes medially; notauli distinct, not sharply indicated on anterior half of mesonotum; median lobe broadly rounded posteriorly; metapleurae, propodeum, first sternite, and second sternite basally, are all covered very densely with beautiful silver hairs; first and second tergites not pubescent; abdomen as long as the head and thorax united, as long as in *atriplicis*, a little over three-fourths as wide as the thorax, convex above and below; first and second tergites highly polished; first very slightly elevated anteriorly, the median area flattened, traversed longitudinally by three low carinae; basal foveae on second tergite narrow and rather shallow; striae extending to the middle of the segment; no striae between foveae; tergites three and four each with a row of pits across their center from every one of which projects a short white hair; fifth tergite very strongly shagreened except on extreme apex, with scattered punctures medially near the base; sixth tergite more finely shagreened, not punctate; wings hyaline, extending a little beyond the apex of the abdomen. Black to dark reddish-brown, shining; antennae piceous; legs brown, the tarsi and tibiae lighter, touched with yellow; last joint of each tarsus piceous.

Male.—Length 1.3 mm. Antennae stout; pedicel twice as long as wide; third joint wider than long, as wide as the pedicel; fourth broad and flattened, hardly narrowed basally, much wider than the pedicel; joints five and six a little longer than wide, as wide as and slightly longer than joints seven to nine (which are about as long as wide), pilose; last joint as wide as the ninth, a little shorter than the third and fourth united, conical, sharply pointed apically; abdomen long and slender, slightly over twice as long as wide, a little shorter than the head and thorax combined, narrower than the thorax, rounded posteriorly; wings hyaline, extending the length of the last four segments past the apex of the abdomen. Antennae dark brown; tarsi lighter than in the female.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 2290, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, three females and nine males. They were reared, according to Ashmead, on March 31, 1882, from a Cecidomyid gall on the petiole of a grapevine leaf, collected on the grounds of the Department of Agriculture. One male has been lost off the point and several others are more or less damaged but as a whole the specimens are in good condition. All are mounted on card points.

37. PLATYGASTER LEGUMINICOLAE (Fouts).

Platygaster leguminicolae FOUTS, Proc. Ent. Soc. Wash., vol. 22, 1920, p. 69.

The species was sufficiently well described originally. The types, 29 specimens, were reared from the clover seed midge (*Dasyneura leguminicola* Lintner).

Type locality.—Forest Grove, Oregon.

Type.—Cat. No. 22799, U.S.N.M.

38. PLATYGASTER LUPINICOLA (Ashmead).

Polymecus lupinicola ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 281.

Female.—Length 1.6 mm. Head twice as wide as long, slightly emarginate behind, flattened in front, as wide as the thorax; occiput transversely striate; cheeks subconvex, shagreened posteriorly; frons finely aciculate, diagonally so on the sides; antennae attenuate, the flagellum as long as the thorax; pedicel more than twice as long as wide, as wide as joint six, wider than either of the joints three, four, or five; joint three longer than wide, two-thirds as long as four and nearly as wide; four twice as long as wide, equal to five; six a little longer and wider; seven and eight as long as six but somewhat wider, less than twice as long as wide; nine a little wider than eight; ten as long as the pedicel, acutely pointed apically, the sides curved; thorax two-thirds as wide as long, higher than wide, convex and sparsely pubescent dorsally; pronotum aciculate; mesontum hairy, polished; notauli indicated on basal half, the median lobe broadly rounded behind; scutellum transverse, strongly convex, polished above, pubescent behind and on the sides; wings hyaline; abdomen lost, "longer than the head and thorax together, pointed at apex, contracted from the apex of the second segment; the fourth segment is one-third longer than the third; the fifth and sixth nearly twice the length of the fourth; segments three and four with a transverse row of punctures; fifth aciculated except at base." Black; antennae and legs piceous; tarsi fuscous.

Male.—Length 1.5 mm. Pedicel twice as long as wide, as wide as joints three and four; three slightly longer than wide, indistinctly more than half as long as the pedicel; four as long as the pedicel, narrowed basally and apically; following joints about one and one-third times as long as wide; ten twice as long as wide, longer than joint two, pointed apically; abdomen broadly elliptical, four-sevenths times as wide as long, as long as the head and thorax united, as wide as the thorax; segments three to seven united half as long as the second; wings hyaline, reaching the length of the last five segments past the apex of the abdomen. Coloration as in female.

Type locality.—San Francisco, California.

Type.—Cat. No. 2271, U.S.N.M. Type female and allotype male selected.

Redescribed from the type material, two females and two males. The female types have no abdomens, the latter having been lost before I saw the specimens.

In Ashmead's type series are two other specimens, a male and a female, which represent another species. They are referable to the other group of the genus in which the head is thick anterior-posteriority and the sculpture strong. Ashmead described the male of this later species as *lupinicola* since he mentions the notauli as being complete. The species *lupinicola* must, however, be restricted to the female which was described first and has therefore been made the electotype.

All of the specimens mentioned above were reared November, 1885, from a Cecidomyid gall on *Lupinus athorea*, collected Mr. Albert Koebele.

39. PLATYGASTER CYNIPICOLA (Ashmead).

Polygnotus cynipicola ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 314.—BRUES. Bull. 22, Conn. Geol. and Nat. Hist. Surv., 1916 (1917), p. 538.

Female.—Length 1 mm. Head about twice as wide as long through the middle, slightly emarginate behind, the cheeks rather full; head sculptured as in *asynaptae*, wider than the thorax; antennae very short and stout, gradually thickened toward apex; scape strongly curved basally, gradually incrassated distally; pedicel about twice as long as wide, broadly elliptical, as wide as the fourth joint; third joint much narrower than the second, one-third as long as the second, about as wide as long; fourth joint a little wider than long; fifth a little narrower but slightly longer than the fourth; six about as wide as long, narrowed basally, as long as the seventh but narrower, wider than the pedicel; joints seven to nine, inclusive, a little wider than long; ten narrower than the ninth, as long as the fourth and fifth united, conic-ovate, pointed apically, the sides not parallel; thorax two-thirds as wide as long, strongly convex dorsally, shining; pronotum polished, finely aciculate except along posterior edge on sides; mesonotum finely shagreened; notauli very shortly indicated basally, the median lobe blunt, not projecting over the fovea; scutellum transverse, highly convex, margined laterally, polished, with a few short scattered hairs on its surface; metapleurae, propodeum, and first tergite at edge, pubescent; abdomen as long as the thorax, convex above and below, broadly elliptical posterior to the first tergite, the first segment forming a sort of neck to the rest; second tergite as wide as long, nearly twice as wide apically as basally, a little narrower than the thorax across the tegulae; foveae with a few short striae on their inner slopes; length of second tergite to those following united as nine is to five; tergites three to five equally long, narrowing apically; six wider than long, blunt at apex; wings hyaline, extending a little beyond the apex of the abdomen. Dark reddish, brown; antennae dark brown, the legs lighter.

Type locality.—Arlington, Virginia.

Type.—Cat. No. 2292, U.S.N.M. Type selected.

Redescribed from the type series, five females. There are no male specimens in the type series. Ashmead labeled one specimen as the male and described it but it proves to be a female.

This species is one of the smallest now included in the genus *Platygaster.* It has somewhat the appearance of *diplosidis* Ashmead.

The types were reared July 3, 1883, from a Cynipid gall, *Neuroterus batalus* Fitch.

40. PLATYGASTER ACTINOMERIDIS (Ashmead).

Polygnotus actinomeridis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 317.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 539.

Female.—Length 1.3 mm. Head twice as wide as long, not emarginate behind, a little wider than the thorax, subconvex in front; occiput finely striate; cheeks subconvex, faintly shagreened above and behind; frons indistinctly aciculate above on the sides, more strongly aciculate below; antennae rather stout, joints seven to nine inclusive being about as wide as long, slightly produced below at their apices; pedicel twice as long as wide, longer and wider than joints three to five; three longer than wide, narrower than four; four slightly longer and wider than five, a little longer than wide; five longer and wider than three; ten twice as long as wide, acutely pointed apically, its upper side curved; thorax finely shagreened, highly convex above; notauli distinct on basal half of mesonotum; median lobe narrowly truncated before the scutellum; scutellum slightly transverse, highly convex, polished, sparsely pubescent; abdomen elliptical, about twice as long as wide, as wide as the thorax, as long as the head and thorax united; first tergite longitudinally fluted, as is also the second tergite between the basal foveae; median area on first tergite quadrate, flat; second tergite a little longer than wide, the sides nearly straight; basal foveae finely striate, the striae reaching slightly past the middle of the segment; tergites three to six unsculptured, united two-thirds as long as the second; six slightly wider than long, rounded posteriorly; wings hyaline, reaching to the apex of the abdomen. Black; antennae piceous; pedicel brown; legs dark brown; anterior tibiae apically, and all tarsi (except the last joint of each), yellowish.

Male.—Length 1.15 mm. Pedicel one and one-half times as long as wide, as wide as joint three; three transverse, as wide as four; four oblong, not enlarged apically, as long as two; following joints a little longer than wide; abdomen ovate, slightly shorter than the head and thorax united, as wide as the thorax, twice as long as wide, rounded apically; tergites three to seven half as long as the second; wings hyaline, extending the length of the last four segments past the apex of the abdomen.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 2297, U.S.N.M. Type female and allotype male selected.

Redescribed from the types, one female and two males, reared April 23, 1884, from a Cecidomyid gall on *Actinomeris squarrosa* Nuttall. One of the paratypes is off point and lost.

The National Museum possesses several specimens of what I take to be this species from Kirkwood, Missouri, reared from a species of *Lasioptera* infesting honey locust. The Cecidomyid host of these specimens and of the types of *actinomerids* are so different that I hesitate to make any definite statement in regard to the identity of the parasites.

41. PLATYGASTER ARTIMESIAE (Ashmead).

Polygnotus artimesiae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 309.

Female.—Length 1.4 mm. Head twice as wide as long through the middle, a little wider than the thorax across the tegulae, not excavated behind; occiput and vertex rather finely striate, as in *asynaptae;* ocellar triangle finely shagreened; frons finely diagonally aciculate, more strongly so toward the malar space; pedicel twice as long as wide, as long as joints three and four united; third joint narrower than the second, two-thirds as long as the fourth; four a little longer than wide, slightly wider than the pedicel; five spherical, as wide as the pedicel; six as long as four, a little wider at apex than four, narrowed basally; joints seven, eight, and nine subequal in width and length, about as wide as long, a little wider than six; last joint conical; thorax two-thirds as wide as long; pronotum finely shagreened; median area broadly transverse, polished, with a few short, faint, transversely directed striae along the sides, wider above than below, the sides curved above; mesonotum strongly convex, rather strongly shagreened on anterior half, polished posteriorly; notauli reaching to the middle of the sclerite, the median lobe rounded posteriorly at apex; scutellum transverse, very highly convex, narrowly margined laterally, polished, sparsely pubescent; metapleurae, propodeum, and first sternite, pubescent; first and second tergites not pubescent; abdomen spatulate, with the broadest part just behind the middle, one and three-fourths times as long as wide; first tergite distinctly less than twice as long as wide, the median area broad, with three or four longitudinal carinae, a little longer than wide, wider than the lateral areas, the dorso-lateral ridges prominent, perpendicular outwardly; second tergite five-sixths times as long as wide; basal foveae strongly striate, the striae extending about to the middle of the segment; space between foveae strongly striate, the striae short, not attaining the apices of the foveae; remaining segments united half as long as the second; tergites three, four, and five subequal in length; six slightly longer, subacute apically, a little wider than long; wings hyaline, extending slightly beyond the apex of the abdomen. Dark reddish brown; antennae and legs brown, the tarsi and tips of anterior tibiae lighter.

Male.—Length 1 mm. Antennae rather stout; pedicel globular, scarcely longer than wide, as long as joint four and about as wide as that joint at the middle; third joint minute, half as wide as the pedicel, about as wide as long; four much widened apically, obliquely excised basally, the lower side straight; joints five to nine inclusive moniliform, as long as wide, as wide as the fourth; tenth joint as long as the two preceding united and as wide as either, shaped as in *asynaptae;* abdomen spatulate, slightly longer than, but just as wide as, the thorax, broadly rounded apically; wings extending the length of the second tergite past the apex of the abdomen.

Type locality.—Lancaster, Los Angeles County, California.

Type.—Cat. No. 2286 U.S.N.M. Type female and allotype male selected.

Redescribed from the type series of 21 specimens. They were reared by A. Koebele, December 6, 1887, from a Cecidomyid gall found on *Artemisia californica.*

The striations on the second tergite are susceptible to some variation. Sometimes the median striae extend to the middle of the tergite and at other times are much shorter.

42. PLATYGASTER SALICICOLA (Ashmead).

Polygnotus salicicola Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 305.—Brues, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 539.

Female.—Length 1.5 mm. Head twice as wide as long through the middle of the occiput, slightly excavated behind, a little wider than the thorax across the tegulae; occiput rather strongly transversely striate; cheeks shagreened posteriorly; interocellar area very faintly shagreened; frons covered with fine undulating aciculate; antennae short and stout, the club joints wider than long; thorax three-fourths as wide as long, convex above; pronotum finely shagreened, the carinae obsolescent; notauli faintly indicated on basal half of mesonotum; mesonotum (except median lobe posteriorly and lateral lobes outwardly) finely shagreened; scutellum circular, with a narrow margin laterally, polished, with a few scattered short white hairs; metapleura, propodeum, and first sternite covered with short white hairs; first and second tergites without pubescence; abdomen a little longer than the thorax, broadly elliptical; median area on first tergite broad and flat, not much elevated, the lateral areas narrow; striae on second tergite strong and extending a little beyond the middle of the segment; following segments not sculptured, each traversed by a row of short white hairs; wings hyaline, extending a little beyond the apex of the abdomen. Dark reddish brown to blackish; antennae and legs brown, the coxae and femora a little darker.

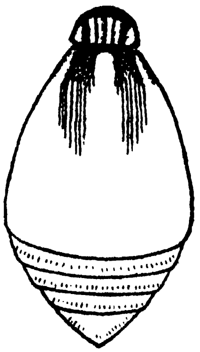
FIG. 7.—PLATYGASTER SALICICOLA (ASHMEAD). ABDOMEN OF FEMALE.

Male.—Length 1.15 mm. Head lost; abdomen as long and as wide as the thorax, more or less egg-shaped, truncate behind, three-fourths as wide as long; segments three to seven united one-third as long as the second; wings slightly touched with brown, extending nearly the length of the second tergite past the apex of the abdomen. Coloration as in female.

Type locality.—Los Angeles, California.

Type.—Cat. No. 2281, U.S.N.M. Type male and allotype female selected.

Redescribed from the type material, eight females and one male, reared by A. Koebele from a Cecidomyid gall on the midrib of willow.

The females vary in size and color, one specimen being one millimeter long and of a pale brownish color. In order that it may not be necessary to consult the original description I quote Ashmead in regard to the antennal structure of the male: "pedicel oval, not longer than the second funiclar joint; first funiclar joint moniliform; second thickened at tip, and longer than any of the club joints except the last; club joints except the first, not longer than thick, the last pointed, fusiform, twice as long as the penultimate."

43. PLATYGASTER VIRGINIENSIS (Ashmead).

Polygnotus virginiensis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 309.
Polygnotus proximus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 312.

Female.—Length 1.3 mm. Head shaped as in *viticola;* occiput more finely striate than in *viticola;* cheeks shagreened and with aciculae posteriorly; frons very finely and obliquely aciculate, shining;

antennae long and slender, the flagellum a little longer than the thorax, very gradually thickened apically, all the joints longer than wide; pedicel a little over twice as long as wide, as wide as the sixth joint at apex; third joint twice as long as wide, two-thirds as long as the fourth and a little narrower; fourth twice as long as wide, a little narrower than the pedicel; fifth as long and as wide as the fourth, narrowed at both ends; sixth longer and wider, narrowed basally; joints seven to nine subequal, wider, about one-half longer than wide, the sides parallel; ten as wide as nine, conic-ovate, rather blunt apically; thorax two-thirds as wide as long, a little narrower than the head, strongly convex above, shining; pronotum aciculate laterally, unsculptured before the tegulae; median area transverse, slightly narrowed posteriorly, smooth and shining; mesonotum strongly convex, finely shagreened toward the front, unsculptured posteriorly, sparsely pubescent; notauli incomplete, indicated on basal third of mesonotum; median lobe broadly rounded behind as in *viticola;* scutellum strongly convex, higher than the middle of the mesonotum, margined laterally, smooth and shining, pubescent posteriorly on the sides; metapleurae, propodeum, and first and second sternite covered with short white pubescence; first and second tergites not pubescent; abdomen longer than the head and thorax united, narrower than the thorax across the tegulae, convex above and below; median area on first tergite convex, not well defined, with three longitudinal carinae, the dorsolateral ridges low; first tergite roundedly elevated anteriorly, the elevated portion smooth, the carinae stopping at its base; striae on second tergite reaching to or a little beyond the middle of the segment; tergites three to five each with a row of punctures (interrupted medially) across it, hairs rising from the pits; last tergite laterally and on posterior half with long scattered hairs; wings hyaline, not quite reaching to the apex of the abdomen. Black; antennae and legs dark brown, the tarsi (except last joint of each) and anterior tibiae apically, lighter, touched with yellow.

Male.—Length 1.3 mm. Pedicel twice as long as wide, widest before the apex, as long but not quite as wide as joint four; third joint button-shaped, half as long and about as wide as the fourth; fourth slightly narrowed basally, not emarginate, and not widened apically; joints five to nine distinctly longer than wide, cylindrical, pilose; last joint as long as the third and fourth united, conical; abdomen spatulate, twice as long as wide, seven-ninths times as wide as the thorax across the tegulae, about as long as the thorax; first and second tergites more highly convex than in the female; the striations on second tergite fewer than in the female, shorter between the foveae; wings extending the length of the head past the apex of the abdomen. Coloration as in the female.

Type locality.—Arlington, Virginia.

Other localities.—District of Columbia.

Type.—Cat. No. 24608, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, four females and three males, in the collection of the United States National Museum. *P. proximus* Ashmead I can not separate from this species. The males vary considerably in size, the length varying from 0.9 mm. to 1.3 mm. One male of *proximus* has the fourth antennal joint widened apically, more or less sharply produced at lower angle, wider than the third.

Altogether there are thirteen specimens of this species in the National Museum, the type series of *proximus* (Cat. No. 2289, U.S. N.M., type and allotype selected) consisting of six specimens. The types of *virginiensis* were collected, not reared; those of *proximus* were reared from *Cecidomyia c.-ananassa* Riley on cypress.

44. PLATYGASTER ATRIPLICIS (Ashmead).

Polygnotus atriplicis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 308.

Female.—Length 1.5 mm. Head shaped as in *salicicola*, twice as wide as long; occiput striate as in *salicicola*; cheeks shagreened; interocellar space almost smooth, very faintly aciculate; frons covered with wavy aciculae; antennae more slender than in *salicicola*, the club-joints longer than wide; thorax two-thirds as wide as long, shaped as in *salicicola*, more highly polished; pronotum shagreened, below on the sides longitudinally aciculate, polished behind; median area polished, wider than long, the carinae appearing as sutures, curved outwardly in the middle; mesonotum faintly shagreened anteriorly, finely aciculate in middle of median lobe, otherwise polished; scutellum convex, with a narrow margin laterally, polished, with a few short hairs on sides; metapleurae, propodeum laterally, and first sternite, covered with white pubescence; first and second tergites without pubescence; abdomen the length of the first segment longer than the thorax, as wide as the head, distinctly wider than the thorax; median area on first tergite quadrate, higher than in *salicicola*; second tergite strongly striate basally, the striae not quite reaching to the middle of the segment; wings hyaline, reaching to apex of abdomen. Black; antennae and most of legs piceous; tibiae in part, and tarsi, lighter in color.

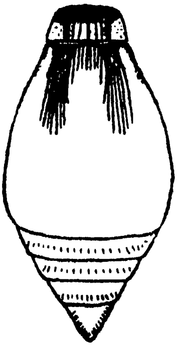

FIG. 8.—PLATYGASTER ATRIPLICIS (ASHMEAD). ABDOMEN OF FEMALE.

Male.—Length 1.3 mm. Differs from the female in antennal and abdominal characters. The abdomen is a little longer and wider than the thorax, broadly rounded apically; wings extending slightly beyond the apex of abdomen; legs as in female; antennae piceous.

Type locality.—Los Angeles County, California.

Type.—Cat. No. 2285, U.S.N.M. Type and allotype female selected. Redescribed from the type material in the collection of the United States National Museum. This material consists of six females and three males, reared, during April and May, from a Cecidomyid gall on *Atriplex canescens*. One of the females is minus the head and another the abdomen.

45. PLATYGASTER ASYNAPTAE (Ashmead.)

Polygnotus asynaptae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 315.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 538.

Female.—Length 1.7 mm. Head seen from above nearly three times as wide as long through its middle; excavated behind, the cheeks moderately full, rounded; occiput strongly transversely striate; cheeks finely shagreened behind, smooth in front and below; vertex subacute, smooth anteriorly; striate posteriorly; interocellar area practically unsculptured, shining; frons very finely aciculate, more strongly so toward the malar space, where the aciculae are oblique; a short, shallow, indistinct groove below anterior ocellus; antennae short but rather slender, the flagellum much shorter than the thorax, gradually incrassated toward tip, the joints seven to nine, inclusive, distinctly but only slightly longer than wide; pedicel a little less than twice as long as wide; third joint a little longer than wide, narrower than the fourth (which is narrower than the second, two-thirds as long as the second and subequal in length and width to the fifth, a little longer than wide); joint six as long as the fifth, slightly wider, as long as the seventh but narrower; last joint as long as the third and fourth united, blunt apically, as wide as the ninth; thorax about twice as long as wide, highly convex dorsally, not compressed, as wide across the tegulae as the head; pronotum finely shagreened over most of its surface, sparsely covered with short, appressed, white pubescence, the median area smooth, highly polished, its sides straight; mesonotum highly convex, shining, shagreened in parts, with four areas of longitudinally placed rows of appressed pubescence; anterior ridges obsolescent, converging posteriorly; notauli distinct to the middle of the segment, meeting in a truncate lobe posteriorly; lateral lobes posteriorly with a growth of long hairs projecting over the scutellar fovea; scutellum transverse, highly elevated, somewhat flattened dorsally, with a narrow margin laterally, rather thickly clothed with short silvery appressed pubescence; metapleurae

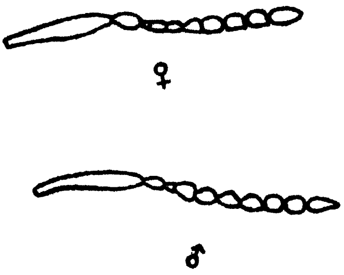

FIG. 9.—PLATYGASTER ASYNAPTAE (ASHMEAD). ANTENNAE.

and propodeum densely pubescent, the silvery hairs decumbent on the former, erect on the latter; first and second tergites hairless; abdomen broadly elliptical, about as long as the head and thorax united, a little over twice as long as wide; first tergite slightly over twice as wide as long (proportion variable), the anterior edge elevated, with many regularly placed longitudinally carinae (sometimes coalescing); median area quadrate, carinate, the dorsolateral ridges not prominent, sometimes obsolete, the tergite evenly rounded above; second tergite about as wide apically as long, twice as wide at apex as at base; basal foveae long and deep, striate, the striae radiating to a little beyond the middle of the segment; area between the foveae with a few short carinae; tergites three to five inclusive, subequal in length and width, the sides oblique, straight; last tergite triangular, as long as the first, one and one-half times as wide as long, blunt apically, the sides straight; wings hyaline, reaching to the apex of the abdomen. Black; antennae and legs dark reddish brown to piceous; tarsi and anterior tibiae at tips yellowish brown.

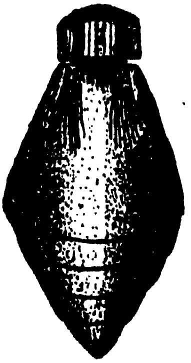

FIG. 10.—PLATYGASTER ASYNAPTAE (ASHMEAD). ABDOMEN OF FEMALE.

Male.—Length 1.6 mm. Mesonotum more strongly shagreened than in the female, polished on posterior half; antennae moderately stout; pedicel one-half times as long as wide; third joint about as wide as the second, as long as wide, a little over half as long as the second, not very closely joined to the fourth; fourth about as long as the pedicel, distinctly wider, about one-half longer than wide, straight, not obliquely excised below, a little wider apically than basally; joints five to nine inclusive subequal in length and width, as wide as the fourth at apex, very little longer than wide; last joint as long as third and fourth united, conical, sharply pointed apically; abdomen as long as the thorax, wider, spatulate, convex above and below, indistinctly less than twice as long as wide, broadly rounded apically; coloration as in female.

Type locality.—Maywood, Illinois.

Type.—Cat. No. 2295, U.S.N.M. Type female and allotype male selected.

Host.—*Asynapta*, species on willow.

Redescribed from the type series, nine females and seven males. The types are mounted on points and are, as a whole, in pretty good condition. The heads are lost from four specimens, three females and one male (the male has lost the thorax as well as the head). Two specimens originally included in type series represents an undescribed species of *Leptacis* Foerster.

Some variation is evident in this species; the notauli are subject to fluctuation as regards their length and depth; the sculpture and slope of the first tergite varies also; color changes always in the species of *Platygaster*, so no special mention of such variation is necessary.

46. PLATYGASTER TEXANA, new species.

Female.—Length, 1.3 mm. Head about three times as wide as long, scarcely excavated posteriorly, distinctly wider than the thorax, with rounded exterior angles; head seen from in front triangular, wider than high, evenly convex above; vertex traversed by a few grooves, not acute; interocellar area faintly reticulate, much wider than high; frons shining, faintly reticulately shagreened above on the sides, obliquely striate medially, more strongly so below; antennal process short, rounded apically; mandibles bidentate, the teeth equal; antennae slender, the flagellum about as long as the thorax; pedicel twice as long as wide, as long as joints three and four united, as wide as the seventh; third joint half as long as the fourth, narrower, bell-shaped; fourth joint as long as the fifth, wider; joints seven to nine twice as long as wide, oblong; last joint longer, acuminate; thorax a little less than twice as long as wide, highly convex above, about as high as wide; notauli faintly indicated basally; mesonotum anteriorly finely reticulate; median lobe of mesonotum narrowly truncated posteriorly; scutellum highly convex, polished, sparsely pubescent; middle tarsi about as long as the tibiae; abdomen approximately twice as long as wide (as wide as the thorax), posteriorly with a slight tail-like effect; second tergite about as wide as long, with a number of foveal striae strongly indicated to the middle of the segment; segments three to six united shorter than the second, polished, each traversed by a row of hair punctures; last segment as long as wide, triangular, narrowly rounded apically; wings hyaline, reaching to the base of the sixth tergite; black, scape, pedicel, mandibles and legs (except coxae and dilated parts of femora and tibiae) reddish-brown.

Male.—Length 1 mm. Pedicel twice as long as wide, nearly as long as joints three and four united, as wide as five; joint three very short, button-shaped, narrower than two; four as long as five but wider, scarcely longer than wide, rounded posteriorly and with the sides parallel; joints five to nine subequal, one and one-half times as long as wide, cylindrical; tenth joint acuminate, three times as long as wide; abdomen about as long and as wide as the thorax, approximately twice as long as wide; wings extending the length of the posterior metatarsus past the apex of the abdomen.

Type locality.—Uvalde, Texas.

Type.—Cat. No. 25855, U.S.N.M. Paratype in author's collection.

Described from one female (type) and two males (allotype and paratype) reared by J. C. Hamlin, June 1, 1921, from (?) *Dactylopius confusus*.

The female may be separated from the same sex in *asynaptae* by noticing the relative lengths of the terminal antennal joints. In *texana* the joints eight and nine are twice as long as wide.

The male would be more likely confused with *lupinicola* but the fourth antennal joint in that species is narrowed at both ends.

47. PLATYGASTER BURKEI (Rohwer).

Polygnotus burkei ROHWER, Proc. U. S. Nat. Mus., vol. 53, 1917, p. 170.

The description given by Mr. Rohwer is incomplete and I doubt if the species could be recognized by it. The figure of the female antenna seems to be correct. This species does not come very close to *diplosidis* Ashmead. It is nearest related to *hiemalis* and *eurotii* and may be distinguished from them by using my key to the species. I append the following notes to Mr. Rohwer's description:

Female.—Length 1.2 mm. Head twice as wide as long; occiput finely striate; frons finely obliquely aciculate; thorax seven-tenths times as wide as long, convex above, a little narrower than the head; pronotum shagreened laterally except at the outer edges of its posterior border; median area finely shagreened; mesonotum finely and uniformly shagreened, the anterior carinae obsolete; notauli short but sharply indicated, the median lobe subacute posteriorly; scutellum transverse, highly convex, smooth and shining, not distinctly margined laterally; abdomen a little longer than the thorax, as wide as the thorax across the tegulae, about three-fifths times as wide as long; first tergite strongly raised anteriorly, very short, the median area distinctly wider than long, with an obsolescent median carina; last four tergites not sculptured, with a row of hairs across each one; wings hyaline, extending a little beyond the apex of the abdomen.

Male.—Length 1.2 mm. Pedicel as in female; fourth joint very wide apically, narrowed basally, the lower side produced apically; following joints a little longer than wide; abdomen as long as the thorax, rounded posteriorly, one-third longer than wide; first tergite a little over twice as wide as long; second as in female, a little wider than long, strongly striate on basal half; wings hyaline, extending half the length of the abdomen past its apex. Color as in female.

Type locality.—Placerville, California.

Redescribed from the types (Cat. No. 19638) in the United States National Museum. They were reared from "a Cecidomyid which lives under the bark at the base of the needles of *Pinus ponderosa.*" The type series consists, not of four females and four males as stated by Mr. Rohwer, but of seven females and one male (the allotype). The antennae have shriveled a little and the sexes are not very easy to distinguish. There are numerous other specimens in the Museum with the same ecological data. They are all mounted on points and placed in the systematic collection.

This species is rather variable. The characters of color and size are inconstant and the comparative lengths and widths of the last four abdominal segments in the female are not denifite. The segments are telescopic and may be protruded or retracted so that the transverse row of hairs may be in the middle of the exposed part of the segment or under the preceding segment.

48. PLATYGASTER HEIMALIS Forbes.

Platygaster heimalis FORBES, Psyche, vol. 5, 1889, p. 39.
Polygnotus heimalis (Forbes), ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 311.—BRUES, Bull. 22, Conn. Geol. Nat. Hist., Surv., 1916 (1917) p. 537.

Female.—Length 1.4 mm. Head twice as wide as long, not emarginate posteriorly, shining; occiput rather finely transversely striate, the vertex nearly smooth, striate medially; interocellar area faintly shagreened; frons finely obliquely aciculate; antennae rather slender, all of the joints longer than wide; pedicel twice as long as wide; fourth joint as long and as wide as the sixth; fifth a little narrower; joints seven to nine one and one-half times as long as wide, cylindrical; ten as long as five and six united, sharply pointed apically; thorax about two-thirds as wide as long, convex above, highly polished; pronotum aciculate laterally; median area transverse, unsculptured, the carinae curved outwardly in the middle; mesonotum finely shagreened anteriorly, mostly polished; notauli short, the median lobe rounded apically, broader than in *burkei;* scutellum transverse, convex, unsculptured; abdomen a little longer than, but only as wide as, the thorax; first tergite twice as wide as long, rounded above; median area not distinctly defined, the longitudinal carinae numerous and none more prominent than others; foveae on second tergite with a few striae extending to about the middle of the segment; area between the foveae with a few short carinae; each of the last four tergites with row of hairs across it (sometimes hidden under the segment in front); wings hyaline, extending half the length of the abdomen past its apex. Black; antennae and legs in most part piceous; apices of anterior tibiae and tarsi (except last joint of each) lighter, brownish.

Male.—Length 1.4 mm. Head slightly emarginate posteriorly; mesonotum anteriorly with fine undulating aciculae; third antennal joint button-shaped, distinctly narrower than the pedicel; fourth joint more than twice as wide apically as basally, wider apically than the scape, strongly produced below, almost L shaped, the inner surface of the L curved; joints five to nine about one and one-half times as long as wide; abdomen egg-shaped, narrowed anteriorly, about as long as and a little wider than the thorax, seven-tenths times as wide as long; first two segments shaped and sculptured as in the female; wings hyaline, extending half the length of the abdomen past its apex. Coloration as in female.

Type locality.—Champaign, Illinois.

Type.—The location of type unknown to author.

Habitat.—North America.

Described from reared specimens from Indiana, Illinois, North Dakota, Nebraska, and Oregon. The species probably occurs wherever the Hessian Fly infests wheat for it is one of the most important parasites of that destructive insect. *Heimalis* and *vernalis* are among the most frequently reared parasites of *Phytophaga destructor* Say. Specimens of *Platygaster vernalis* emerge from the puparia of the Hessian Fly in the spring and specimens of *heimalis* in the fall.

Variations with the exception of size are not common in this species. Some specimens may be twice the size of others but the proportions remain fairly constant. I have examined several thousand specimens in the entomological laboratory at Carlisle, Pennsylvania, and find that with the uniformity in sculpture and color comes uniformity in the number of specimens in the sexes. The males are not more numerous than the females as is the case with *Platygaster vernalis* Myers.

Ashmead in his Monograph says that we have types of this species in the National Museum. I can find none and believe he was mistaken. None of the specimens in the systematic collection bear the date 1888, the year in which Forbes reared the types.

49. PLATYGASTER MARYLANDICA, new species.

Female.—Length 1.10 mm. Head twice as wide as long, elliptical seen from above, scarcely emarginate posteriorly, flattened in front, wider than the thorax; occiput rather strongly striate; cheeks flattened, shagreened; frons mostly polished, finely aciculate and shagreened above on the sides, aciculate below; pedicel twice as long as wide, nearly as long as joints three and four united, about as wide as four; three longer than wide, narrower than two, two-thirds the length of four; four as long and as wide as five, one and one-half times as long as wide; six wider than five, as long as wide at apex; seven and eight a little longer than wide; nine as wide as long; ten longer than the pedicel, blunt at apex, the sides parallel nearly to the tip; thorax higher than wide, strongly convex above; pronotum aciculate laterally; mesonotum shining, finely shagreened (except on median lobe posteriorly, and on the lateral lobes); notauli briefly indicated before the scutellum, the median lobe truncated posteriorly; scutellum transverse, very high and convex, polished, sparsely pubescent laterally; abdomen elliptical, the sides regularly curved, as wide as the thorax, twice as long as wide, as long as the head and thorax united, pointed apically; first tergite regularly arched above, with numerous longitudinal carinae, without a flattened area sublaterally; second tergite slightly longer than wide, the sides curved; basal foveae not very distinct, striate, the striae not quite attaining the middle of the segment; area between the foveae shortly fluted; segments three to six united three-fifths as long as the second, unsculptured; wings hyaline, reaching to the apex of the abdomen. Black; antennae and legs piceous; trochanters brownish; anterior tibiae apically, all tibiae basally, and all tarsi (except the last joint of each) yellow.

Male.—Length 1.10 mm. Pedicel twice as long as wide; joint three wider than long, half as long and as wide as two; four as long as the pedicel, very little longer than wide, widened just below the apex, subacute below; joints five to nine as long as the pedicel; six to nine one and one-third times as long as wide; ten as long as two and three united, acute apically; abdomen obovate, rounded behind, narrower than the thorax, slightly over twice as long as wide, strongly convex above, nearly as long as the head and thorax united; tergites three to seven short, united half as long as the second, each traversed by a row of punctures; wings hyaline, extending two-thirds the length of the second tergite past the apex of the abdomen. Coloration as in the female.

Type locality.—Glen Echo, Maryland.

Type.—Cat. No. 25440, U.S.N.M. Six paratypes in Collection Fouts.

Described from two females and nine males which I collected at Glen Echo, July 19, 1919, on the leaves of *Liriodendron tulipifera* Linnaeus. The species is probably parasitic on some gall making Dipteron infesting the tulip tree.

The female paratype has the abdomen and part of the antennae lost. All the types are mounted on card points.

50. PLATYGASTER EUROTIAE (Ashmead).

Polygnotus eurotiae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 315.

Female.—Length 1.3 mm. Habitus of *hiemalis;* head a little over twice as wide as long, slightly emarginate posteriorly; occiput and cheeks behind transversely aciculate; vertex rounded, striate medially finely shagreened laterally; frons with fine wavy aciculae; antennal structure as in *hiemalis*, all the joints longer than wide; thorax seven-ninths times as wide as long, slightly narrower than the head; pronotum aciculate on the sides, smooth posteriorly; median area transverse, unsculptured; mesonotum convex, highly polished, with a few faint wavy aciculae anteriorly; notauli distinct on basal two-thirds of mesonotum; median lobe rounded posteriorly as in *hiemalis;* first tergite with a few hairs on its edges; second hairless; abdomen shaped generally as in *hiemalis*, a little more pointed apically, slightly longer than the thorax; first tergite twice as wide as long, elevated anteriorly; dorsolateral ridges well defined, the median area quadrate, smooth, with a median carina; second tergite a little longer than wide apically, twice as wide apically as basally, strongly striate at base, the striae reaching the middle of the segment, the striae between the foveae nearly as long; mixed in with these striae between the foveae are three longitudinal carinae, one median and two sublateral; remaining segments unsculptured; three to five equally long; six triangular, wider than long, subacute apically; wings hyaline; extending about the length of the last three tergites past the apex of the abdomen. Black; legs and antennae piceous; tarsi brown.

Type locality.—San Bernardino County, California.

Type.—Cat. No. 2293,U.S.N.M. Type selected.

Redescribed from the two types in the United States National Museum. They were reared April 17, 1887, from a Cecidomyid gall on *Eurotia canata.*

51. PLATYGASTER ATRAE, new species.

Female.—Length 1.10 mm. The description of *cynipicola* applies almost equally well to this species. *Atrae* differs in having the eighth and ninth antennal joints not distinctly wider than long, and in having the abdomen as long as the head and thorax united, more pointed apically. Coloration as in *cynipicola*; wings hyaline.

Male.—Length 1.20 mm. Pedicel a little less than twice as long as wide, slightly longer and narrower than joint four; three as wide as long, much narrower than two or four; four about as long as wide at apex, widened apically and subacute below; five as wide as long; six to nine slightly longer than wide, cylindrical, as long as four; ten longer than the pedicel, sharply pointed apically, the sides curved; abdomen longer than the thorax, twice as long as wide; last five segments united one-third as long as the second; wings hyaline, extending one-half the length of the second tergite past the apex of the abdomen. Coloration as in the female; antennae and legs brown; tarsi paler, yellowish.

Type locality.—Fort Grand, Arizona.

Type.—Cat. No. 25442, U.S.N.M. Paratype in Collection Fouts.

Described from two females and one male reared by H. K. Morrison, June 5, 1882, from the goldenrod stem gall of *Oedaspis atra* Loew and recorded in the Bureau of Entomology under Pergande's number "2733^{01}."

52. PLATYGASTER FUMIPENNIS, new species.

Female.—Length 1.3 mm. Habitus of *virginiensis* but the abdomen not so elongate; head twice as wide as long, not emarginate behind, about as wide as the thorax; occiput transversely striate; frons aciculate; antennae rather slender, all the joints longer than wide; joints six to ten subequal in width, wider than the pedicel; pedicel much wider than joints two to five which are subequal in width; six to nine equally long, a little longer than wide; abdomen elliptical, shorter than the head and thorax united, about twice as long as wide, a little wider than the thorax; median area on first tergite quadrate, sharply defined laterally, flattened; basal foveae on second tergite rather short, with a few striae which extend slightly beyond their apices but do not reach the middle of the segment; a few short striae between the foveae; apical segments not sculptured; wings brownish, extending the length of the last four segments past the apex of the abdomen. Black; antennae piceous, legs dark brownish.

Male.—Length 1.3 mm. Antennae slender, all the joints longer than wide; joint four nearly twice as long as wide, scarcely widened apically, distinctly shorter than the two following joints united; joints five to nine a little longer than wide, rounded at the ends; abdomen spatulate, as wide as the thorax, a little less than twice as long as wide, broadly rounded apically; wings brownish, extending the length of the last five segments past the apex of the abdomen.

Habitat.—United States.

Type.—Cat. No. 25442. Two paratypes in Collection Fouts.

Described from four females and one male, each bearing the label "4^{03}, 161 F 85." The labels are in Theodore Pegande's handwriting. No notes filed under this number can be found in the files of the Bureau of Entomology, and it is therefore impossible to give the locality and name of the host.

53. PLATYGASTER LATICEPS (Ashmead).

Polygnotus laticeps ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 311. Male, not female.

Male.—Length 1.58 mm. Head a little more than twice as wide as long, flattened in front and behind; frons rather strongly striate (except medially), with straight carinae above the insertion of the antennae; ocelli large, the lateral ones placed halfway between the eye margins and the anterior ocellus; occiput striate; antennae rather elongate, the joints beyond the third longer than wide and densely covered with short white hairs; pedicel twice as long as wide, as long and as wide as joint five; third joint as long as wide, as wide as joint four, indistinctly wider than the pedicel; joint four twice as long as wide, not or scarcely widened apically, about as long as the pedicel; joints five to nine subequal, twice as long as wide, cylindrical; joint ten long, pointed, three times as long as wide; thoracic ratio: length 31 (0.69 mm.), width 22, height 24; mesonotum convex, shining, shagreened; notauli distinct to the middle of the mesonotum, not posteriorly; median lobe of mesonotum truncate posteriorly, nearly touching the scutellum; scutellum convex, polished above, faintly shagreened laterally, with its dorsal plate turned up a little apically, a condition found in a more advanced stage in *Platygaster hyalinipennis* Ashmead; abdomen a little longer and narrower than the thorax, spatulate, rounded posteriorly, not quite twice as long as wide (33 to 18 being the exact proportions); first tergite twice as long as wide, elevated medially, the elevation rounded and traversed by many longitudinal grooves; second tergite a little longer than wide, almost twice as wide apically as basally, the sides slightly curved; basal foveae rather deep, the striae reaching the middle of the segment, neither numerous nor strongly indicated; tergites three to seven polished, subequal in length, each traversed by a row of punctures; wings hyaline, with short cilia marginally. Black; antennae dark brown; legs brown, the trochanters, tibiae and tarsi somewhat lighter.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 2461, U.S.N.M.

Described from the type. The females originally included in the type series represent a new species and are now the types of my new species *Platygaster errans.*

54. PLATYGASTER EUURAE (Ashmead).

Polygnotus euurae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 318.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 540.

Male.—Length 1.3 mm. Head twice as wide as long through the middle, slightly emarginate behind, a little wider than the thorax, occiput transversely striate, more finely than in *virginiensis;* cheeks shagreened posteriorly; vertex subacute, aciculate laterally, nearly smooth medially; interocellar area highly polished, very finely aciculate; frons with fine diagonally directed wavy aciculae; flagellum a little shorter than the thorax; pedicel less than twice as long as wide, as wide as joint three, slightly narrower than joint four; three transverse; joints four to nine subequal in length and width, distinctly longer than wide, as long as the pedicel; ten a little longer than three and four united, sharply pointed apically; thorax very short and broad, nearly as wide as long, strongly convex above; pronotum aciculate on sides; median area transverse, unsculptured, slightly narrowed posteriorly; mesonotum shining, with the two anterior carinae low but distinct; area to the sides of these carinae shagreened; between them narrowly shagreened anteriorly; otherwise mesonotum not sculptured; notauli distinct on basal half of mesonotum, the median lobe as in *virginiensis;* scutellum as in *virginiensis,* slightly flattened dorsally; metapleurae, propodeum and first and second sternites densely covered with short silvery pubescence; first and second tergites with a few scattered hairs; abdomen four-sevenths times as wide as long, broadly rounded behind, a little longer than the thorax; first tergite not quite twice as wide as long, elevated anteriorly and posteriorly, the sides oblique; median area longer than wide, not distinctly margined laterally, with a median carina; second tergite more than twice as wide apically as basally, the sides straight except near the apex; basal foveae shallow, strongly striate, the striae reaching to the middle of the segment; median area broad, elevated anteriorly, with several short carinae; following segments short, broadly transverse, united a little less than half the length of the second; wings broad, hyaline, extending half the length of the second tergite past the apex of the abdomen. Dark brown; antennae the color of the abdomen; legs lighter brown; tarsi touched with yellow.

Type locality.—St. Louis, Missouri.

Type.—Cat. No. 2299, U.S.N.M.

Redescribed from the two male types. Both were reared from the Tenthredinid gall *Euura s.-nodus* Walsh. Ashmead says in the original description, "The species is unquestionably parasitic on inquilinous Cecidomyious flies known to inhabit this gall, and not on the Tenthredinid."

55. PLATYGASTER LONGIVENTRIS (Ashmead).

Isocybus longiventris Ashmead, Can. Ent., vol. 19, 1887, p. 130.—Cresson, Syn of Hym., 1887, p. 249.—Ashmead, Bull, 44, U. S. Nat. Mus., 1893, p. 330.

Female.—Length 1.2 mm. Head very thick and broad, wider than the thorax, twice as wide as long through the middle, strongly convex anteriorly and deeply emarginate posteriorly; cheeks convex; occiput and cheeks behind finely aciculate; vertex and most of frons highly polished; frons below finely diagonally aciculate; antennae rather short, stout; joints seven to nine a little longer than wide, thick; ten as long as three and four united, oval, broadly rounded apically; thorax twice as long as wide, not very strongly convex above; pronotum aciculate anteriorly on the sides; mesonotum polished; notauli indicated by two short lines not more than half as long as the scutellum; scutellum circular, evenly convex, highly polished, without pubescence, first and second tergites without pubescence; abdomen stongly flattened above and below, subconvex on second sternite, as wide as the thorax; length of abdomen to that of head and thorax united as four is to three; first tergite about twice as wide as long, evenly rounded above, with regularly placed carinae, the median area not defined; foveae on second tergite narrow, with a few faint striae extending a little beyond their apices; area between the foveae broad, unsculptured; segments beyond the second polished; wings hyaline, extending to the apex of the first tergite. Reddish brown; legs and antennae (except club which is brown) bright yellow.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 24609, U.S.N.M.

Redescribed from the type specimen. This species in habitus recalls certain ones of those in the group of *vancouverensis* and *compressiventris*. The sculpture is entirely different however.

56. PLATYGASTER PENTATOMA (Ashmead).

Anopedias pentatomus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 292.

Female.—Length 0.7 mm. Head shaped somewhat as in *longiventris* but not emarginate behind, a little over half as long as wide; occiput and cheeks convex, the former entirely, the latter posteriorly, finely shagreened or aciculate; frons polished, convex, without sculpture except around the bases of the antennae where it is finely aciculated; pedicel about one and one-half times as long as wide, much wider than joint three which is as long as wide; joint four as wide as three and very slightly longer than four; joints seven to nine about as wide as long, as wide as the pedicel; ten two-thirds as wide as long, convex dorsally, unsculptured except on pronotum laterally where it is finely aciculate; notauli short, the median lobe sharply pointed posteriorly; scutellum as in *longiventris*, but pubescent; abdomen elliptical, slightly shorter than the head and thorax united, as wide as the thorax, twice as long as wide, pointed apically; first tergite twice as wide as long, not elevated anteriorly, the median area not well defined; second tergite indistinctly longer than wide, nearly twice as wide apically as basally, the sides slightly curved; striae extending to the apices of the foveae; area between the foveae with a few short carinae and striae which do not extend beyond their apices; last four segments subequal in length, united half as long as the second; ovipositor exserted for a short distance; wings hyaline, extending slightly beyond the apex of the abdomen. Amber-colored; scape yellowish, tinged with fuscous apically; joints two to six of antenna yellowish, the other joints fuscous; legs entirely yellowish brown, darker on femora and tibiae.

Male.—Length 0.6 mm. Similar generally to the female; third antennal joint a little wider than long, narrower than the fourth joint; four as wide and as long as the pedicel, narrowed basally, produced below at apex, the lower side straight; joints five to seven as long as four, one and one-half times as long as wide; joints eight to ten lost; abdomen elongate, elliptical, two and one-half times as long as wide, as long as the head and thorax united, as wide as the thorax; wings extending the length of the last four segments past the apex of the abdomen. Appendages as a whole lighter colored than in the female mostly yellow; flagellum brownish.

Type locality.—Arlington, Virginia.

Type.—Cat. No. 24610, U.S.N.M.

Redescribed from the type. The male, peculiar in the extreme elongation of the abdomen, is here described for the first time. It was in the national collection determined by Ashmead.

57. PLATYGASTER SEMIGLABER (Girault).

Polymecus semiglaber GIRAULT, Proc. U. S. Nat. Mus., vol. 58, 1920, p. 177.

The following description may be considered to consist of additions and corrections to Mr. Girault's original description.

Female.—Length 1.33 mm. Head twice as wide as long, very slightly excavated posteriorly; frons polished, faintly aciculate below; occiput with few transverse raised lines; antennae finely pubescent, the relative proportions of the joints as follows: Length 48, 13, 6, 8, 8, 12, 11, 11, 11, 16; width, 9, 7, 5, 6, 6, 9, 9, 10, 8, 8; length of thorax 15 (0.333 mm.), width 11, height 12; notauli briefly indicated posteriorly, nearly meeting in front of the scutellum; scutellum circular, polished, without any trace of a tubercle; length of abdomen 0.80 mm.; the following abdominal proportions are taken from a specimen on a slide; relative length of segments 17, 68, 24, 22, 24, 36; width, 22, 40, 30, 28, 26, 20; the last tergite is narrowed toward tip, blunt; the ovipositor may or may not be extended; those specimens on the slide have it so because they were subjected to pressure by the cover glass.

Male.—Length 1 mm. Relative proportion of antennal joints as follows: Length 45, 12, 7, 14, 7, 8, 8, 8, 8, 16; width, 10, 8, 6, 16, 8, 8, 8, 8, 8, 7; fourth joint crescent-shaped, deeply excavated on the lower side at base, its attachment to fifth joint on the back of the crescent; antennae sparsely covered with short hairs; joints 5-10 with a short pedicel between each; abdomen about as long as the head and thorax united, broadly elliptical, twice as long as wide, as wide as the thorax.

Type locality.—Albany, New York.

Type.—Cat. No. 20610, U.S.N.M.

The types were reared from the galls of *Rhopalomyia hirtipes* by Dr. E. P. Felt. The type series consists of four females and one male mounted on a card point and a male head and four females mounted on a slide.

The measurements noted in the description were made by means of a disk micrometer graduated to tenths of a millimeter. In measuring the antennae and abdomen I used a Bausch and Lomb microscope, 160 mm. draw tube, No. 5 ocular and 4 mm. objective. All other measurements in this paper, more particularly those of the thorax, were made with the use of a Bausch and Lomb binocular microscope, No. 5 ocular and 24 mm. objective. With the latter combination 45 divisions in the visual field equal one millimeter.

58. PLATYGASTER LINEARIS, new name.

Polymecus lasiopterae GAHAN, Proc. U. S. Nat. Mus., vol. 53, 1917, p. 217. (Preoccupied by *lasiopterae* Kieffer and Jörgensen, Centralb., Bakt. Paras. Insect., pl. 27, 1910, p. 401.)

Gahan's description should be used in connection with my own.

Female.—Length 1.22 mm. Head not quite twice as wide as long, slightly emarginated posteriorly, wider than the thorax, without distinct sculpture of any sort; antennae short, the pubescence not visible except under the high power of the microscope; relative proportions of the antennal joints as follows: Length, 40, 14, 5, 7, 8, 10, 10, 10, 10, 15; width, 8, 7, 5, 6, 6, 7, 8, 8, 8, 8; thoracic ratio: Length 15 (0.333 mm.), width 9, height 12; mesonotum convex, polished, its narrow, rounded median lobe touching the scutellum; notauli very faint and short, diverging rapidly anteriorly; abdomen nearly twice as long as the head and thorax united, remarkably flat, polished, with little pubescence except near its tip; second tergite not quite as wide as the thorax, longer than wide; basal foveae small, with a few faint striae at their apices; segments three to six united nearly twice as long as the second; wings hyaline, iridescent, reaching to the apex of the fourth segment. Black; base of scape, trochanters, all tibiae at base, and all tarsi, more or less testaceous.

Male.—Length 1 mm. Pedicel twice as long as wide, as wide as joint five; third joint broadly transverse, button shaped, a little wider than the pedicel; fourth joint as thick as the scape, less than twice as long as wide, only slightly curved; joint five about as long as wide, as wide as the pedicel; following joints to the tenth subequal, longer than wide, as wide as the fifth; tenth joint sharply pointed, as long as the third and fourth united; abdomen elliptical, nearly three times as long as wide, as wide as the thorax, a little longer than the head and thorax united, rounded apically; wings reaching beyond the apex of the abdomen, with short cilia marginally.

Type locality.—Elk Point, South Dakota.

Type.—Cat. No. 20397, U.S.N.M.

Redescribed from the type series, six females and one male, reared by C. N. Ainslie from *Lasioptera* species infesting *Muhlenbergia*. The specimens are recorded in the Bureau of Entomolgy under Webster No. 11838.

59. PLATYGASTER ERRANS, new species.

Platygaster laticeps ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 311 (female, not male).

Female.—Length 1.7 mm. Head a little over twice as wide as long, more or less lenticular in shape, not excavated behind, the cheeks oblique and narrow, subconvex; occiput very strongly transversely striate; cheeks shagreened; vertex rounded, striate; interocellar area finely shagreened; frons mostly polished, unsculptured, faintly aciculate below; antennae rather stout; pedicel two and one-half times as long as wide, not much narrower basally, as wide as joint five (which is a little narrower than four); three a little longer than wide, narrower than the pedicel; joints six to nine about as wide as long; ten as long as the pedicel, conical, pointed apically; thorax three-fourths as wide as long, convex dorsally; pronotum longitudinally aciculate on the sides; median area unsculptured, the sides curved below, straight above; mesonotum finely shagreened on anterior half, otherwise polished; notauli distinct on posterior half, the median lobe broadly rounded posteriorly; scutellum very high, evenly convex, broadly margined laterally, polished, pubescent on the sides; abdomen a little longer than the head and thorax united, as wide as the thorax four-fifths as wide as the head; first tergite twice as wide as long, hardly elevated anteriorly, the median area distinctly transverse, with many closely placed longitudinal carinae; basal foveae very strongly striate, the striae extending nearly to the apex of the second segment, median area on second tergite elevated anteriorly, with six short longitudinal carinae; terminal segments unsculptured, each traversed by a row of short white hairs; wings hyaline, extending the length of the last four segments past the apex of the abdomen. Black; antennae and most of the legs dark brown to piceous; tarsi and anterior tibiae yellowish.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 24612, U.S.N.M. Three paratypes in Collection Fouts.

Described from ten female specimens from Jacksonville, Florida. These specimens formerly constituted the greater part of the type series of *Polygnotus laticeps* Ashmead, but they differ specifically from the male, the true type of that species.

60. PLATYGASTER FELTII Fouts.

Platygaster feltii FOUTS, Proc. Soc., Wash., vol. 22. 1920, p. 70.

This species was sufficiently well described in the reference mentioned above. The type series consists of nine specimens from Austin, Texas, reared by Dr. E. P. Felt, March 19, 1919, from the gall of *Walshomyia texana* Felt on cedar.

Type.—Cat. No. 22800, U.S.N.M.

61. PLATYGASTER TUMIDA (Ashmead).

Polygnotus tumidus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 310.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 538.

Female.—Length 1.5 mm. Head a little over twice as wide as long, scarcely emarginate behind, in front feebly convex; occiput very strongly and closely transversely striate; cheeks flattened, shagreened above, unsculptured below; vertex acute; interocellar area finely shagreened; frons above unsculptured, below faintly aciculate; antennae stout, the flagellum distinctly shorter than the thorax; joints one to five longer than wide, three the narrowest, four and five subequal, shorter than two; six as long as wide; seven to nine a little wider than long, widened apically; ten as long as two, broadly rounded apically, the sides parallel; thorax three-fifths as wide as long, narrower than the head, strongly convex above, higher than wide; pronotum finely aciculate on the sides; median lobe of mesonotum in greater part finely shagreened, truncated posteriorly, the notauli very short; lateral lobes finely shagreened anteriorly; scutellum circular, highly convex, polished, sparsely pubescent; abdomen broadly elliptical, pointed apically, longer than the thorax (but not as long as the head and thorax united), slightly narrower than the thorax, three-fifths as long as wide; median area on first tergite with several longitudinal carinae; second tergite as wide at apex as long, twice as wide at apex as at base, the sides straight; basal foveae long, shallow, extending to the middle of the segment, striate, the striae hardly reaching their apices; a few short carinae between the foveae; tergites three to six unsculptured, united half as long as the second; wings hyaline, extending slightly beyond the apex of the abdomen. Shining black; antennae piceous; legs brownish; tarsi, anterior tibiae apically and middle and posterior tibiae basally, touched with yellow.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 2288, U.S.N.M.

Redescribed from the type specimen in the National Museum, reared February 25, 1881, from the gall of *Cecidomia symmetrica* Osten Sacken, a growth common on the leaves of various oaks.

62. PLATYGASTER COLUMBIANA, new name..

Polygnotus alnicola Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 310. (Preoccupied by *Polymecus alnicola* Ashmead, described in Bull. 45, U. S. Nat. Mus., 1893, p. 283.)

Female.—Length 1 mm. Head a little over twice as wide as long, shaped as in *laticeps*; occiput and vertex strongly striate, more finely so than in *laticeps*; cheeks aciculate; frons highly polished, flattened, with a few aciculae below; antennae stout; pedicel twice as long as wide; third joint much narrower, nearly half as long as the pedicel, as long as wide; joints four and five two-thirds as long and about as wide as two; each of joints seven to nine a little wider than long, broader apically; ten one-half longer than wide, blunt at tip, the lower side straight; thorax five-sixths as wide as the head, three-fifths as wide as long, strongly convex above, shining and unsculptured except as mentioned below; pronotum with very fine wavy aciculae on the sides; median area as in *laticeps*; mesonotum very strongly convex medially and curving downward posteriorly, recalling the form found in *diplosidis* Ashmead, with a few faint aciculae on anterior half; notauli indicated on basal fourth, the median lobe broadly rounded behind; scutellum as in *laticeps* but pubescent and more narrowly margined laterally; abdomen a little shorter than the head and thorax united, ovate, rounded on the sides toward the apex, subacute apically, as wide as the thorax, two-thirds as wide as long; first tergite sculptured as in *laticeps*, without pubescence; second as wide as long, without pubescence, twice as wide apically as basally, the sides curved, sculptured as in *laticeps* except that the lateral striae do not extend beyond the middle of the segment; terminal segments unsculptured, united half as long as the second, each with a row of white hairs across its middle; wings hyaline, extending the length of the last two segments past the apex of the abdomen. Black; antennal club, coxae, and last joint of each tarsus piceous; scape and legs (except tarsi and anterior tibiae apically which are touched with yellow) reddish-brown.

Male.—Length 1.3 mm. Antennae moderately slender; pedicel one-third longer than wide; third joint nearly as wide as the pedicel, transverse, half as long as the fourth which is as long and a little wider than the pedicel, not much narrowed basally, its lower side straight; joints five to nine subequal in length and width, distinctly, but only slightly, longer than wide; joint ten as long as three and four united, acute at apex; abdomen egg-shaped, a little longer than the thorax, convex above and below, twice as long as wide, rounded posteriorly; wings hyaline, extending a little beyond the apex of the abdomen.

Type locality.—District of Columbia.

Type.—Cat. No. 2287, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, three females and one male. The male is here described for the first time. The types were reared July 31, 1886, from a Cecidomyid gall in the flower bud of Alder.

62. PLATYGASTER BACCHARICOLA (Ashmead).

Polygnotus baccharicola ASHMEAD, Can. Ent., vol. 19, 1887, p. 132.—CRESSON, Syn. of Hym., 1887, p. 250.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 306 (pl. 13, fig. 2, female).—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 539.

Female.—Length 1 to 1.2 mm. Head a little over twice as wide as long: occiput striate; cheeks shagreened; vertex, interocellar area, and space around lateral ocelli, shagreened; frons above highly polished, below finely aciculate; antennae moderately stout, gradually thickened toward tip; joints three and four united distinctly shorter and a little narrower than the second; four slightly longer and wider than three; five and six subequal, a little longer but no wider than four, a trifle longer than wide; seven as long as wide; eight and nine as wide as the scape, distinctly wider than long; ten one and one-half times as long as wide, conical with both sides curved; thorax three-fourths as wide as long, strongly convex above, as wide as the head; pronotum finely shagreened in lower anterior corners; mesonotum nearly entirely finely shagreened, only a band along the posterior margin being polished; notauli finely indicated on basal half, the median lobe broadly rounded behind; scutellum transverse, strongly convex, shining and unsculptured, margined laterally; abdomen elliptical, about as long as the head and thorax united, a little narrower than the thorax, twice as long as wide; first tergite without pubescence, three times as wide as long, evenly rounded above, with regularly placed longitudinal carinae; median area not well defined; second tergite without pubescence, a little longer than wide, two-thirds as wide anteriorly as posteriorly; foveae narrow and shallow, finely striate along their inner slopes, the striae extending but half the length of the foveae past their apices; interfoveal area with a few indistinct carinae as long as the foveae: last segment as long as the two preceding, about as long as wide, pointed apically; last four segments united one-third the entire length of the abdomen; wings hyaline, reaching a little beyond the apex of the abdomen. Black: antennae and legs dark brown; anterior tibiae apically and basally, other tibiae basally, and all tarsi (except the last joint of each) yellowish.

Male.—Length 0.8 mm. Antennae very short, the flagellum considerably shorter than the thorax; pedicel twice as long as wide, much wider than and four times as long as joint three; joint four three-fourths as long as two, much wider than two or any other joint following it, broadened apically and sharply produced below at apex; joints five to seven rounded, as long as wide; eight and nine distinctly transverse, a little wider than seven; ten twice as long as wide, as long as three and four united, acute at tip, the lower side straight; abdomen spatulate, narrowly rounded posteriorly, as long as the thorax, narrower, twice as long as wide; wings hyaline, reaching the length of the head past the apex of the abdomen.

Type locality.—Florida.

Type.—Cat. No. 2863, U.S.N.M. Type male and allotype female (on same pin) selected.

Host.—*Cecidomyia baccharicola* Ashmead MS.

Redescribed from the type series, seven females and one male. Ashmead originally included 18 specimens in his type series but I find 10 of these represent several species differing from those selected as the types. They remain undescribed.

The sculpture on the mesonotum is susceptible to variation. Although usually entirely shagreened the mesonotum may be sometimes extensively polished posteriorly.

64. PLATYGASTER ANTENNARIAE (Ashmead).

Synopeas antennariae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 288.
Amblyaspis antennariae (Ashmead) BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 533.

Female.—Length 1.4 mm. Head twice as wide as long, not emarginate behind, the cheeks strongly convex, shagreened above; occiput transversely aciculate; interocellar triangle very low, not distinctly sculptured; space around lateral ocelli finely shagreened; frons not distinctly sculptured above, sometimes with extremely faint aciculations, diagonally aciculate below; antennae elongate and rather slender; pedicel two and one-half times as long as wide, as wide as joint six apically; joint three longer than wide, half as long and half as wide as the pedicel, two-thirds as long and very little narrower than four; four and five subequal, one and one-half times as long as wide, a little shorter than six; joints seven to nine as long and as wide as six, about twice as long as wide; ten a little wider and longer, twice as long as wide, subacute apically, the sides rounded; thorax two-thirds as wide as long, flattened above, as wide as the head; pronotum finely longitudinally aciculate below on the sides, above polished, without sculpture; mesonotum flattened finely shagreened on anterior half, polished posteriorly; notauli distinct on basal two-thirds, widely separated, the median lobe broadly rounded posteriorly; scutellum transverse, subconvex, highly polished, narrowly margined laterally; abdomen as long as the head and thorax united; first and second tergites without pubescence; median area on first longer than wide; lateral foveae on second striate, the striae extending very slightly beyond their apices; interfoveal area with three short carinae, one median; tergites beyond the second not sculptured, with a row of hairs across each; wings hyaline, extending the length of the last segment past the apex of the abdomen. Amber-colored; antennae dark brown; legs yellowish brown.

Male.—Length 1 mm. Differs little from the female in general structure and color; antennae elongate, all the joints longer than wide; pedicel broad, twice as long as wide, as wide as any of the flagellar joints except the second and last; third joint half as long as the pedicel, a little over half as wide; fourth joint slightly wider apically than the pedicel, much widened at the apex, one and one-fourth times as long as wide, the proportions varying with different degrees of shrinkage (usually one and one-half times as long as wide); abdomen as long as the head and thorax united, long-ovate, as wide as the thorax, twice as long as wide, rounded posteriorly; wings hyaline, extending the length of the last four segments past the apex of the abdomen. Color lighter than in the female, the legs often bright yellow; antennae brownish.

Type locality.—Milwaukee, Wisconsin.

Type.—Cat. No. 2274, U.S.N.M. Type male and allotype female selected.

Host.—*Cecidomyia antennaria* Wheeler.

Redescribed from the types, fifteen females, and ten males. It seems likely that the specimens were killed too soon after emerging to attain their normal color. The shrinkage of the male antenna lends support to this veiw. The sculpture on the second tergite is subject to variation, the striae being more numerous and stronger in some individuals than in others.

64. PLATYGASTER PINI, new species.

Female.—Length 1.5 mm. Shape of the body somewhat as in *antennariae* but the thorax not so flattened, higher than wide seen from the side. Head twice as wide as long, slightly emarginate behind, the cheeks subconvex viewed from above; occiput transversely striate, more coarsely so than in *antennariae;* cheeks finely shagreened; interrocellar area and space around lateral ocelli indistinctly shagreened; frons mostly polished, unsculptured, below and on the sides finely shagreened; flagellum as long as the thorax; antennal joints two to five, inclusive, equally wide; joint six a little wider; seven to ten subequal in width, slightly wider than six; pedicel two and one-half times as long as wide, about as long as joints three and four united; three half as long as two; four and five equally long; six a little longer; seven to nine slightly longer than six; ten as long as the pedicel, acute apically, the sides rounded; thorax nearly twice as long as wide, strongly convex above, distinctly narrower than the head; pronotum finely longitudinally aciculate below, polished behind; mesonotum polished; notauli widely separated and extending to the anterior third of the mesonotum the median lobe broadly rounded; scutellum transverse, very highly elevated, narrowly margined laterally, polished and without pubescence above; abdomen elliptical, of a similar form to that found in *antennariae*, twice as long as wide, as wide as the thorax; median area on first tergite about as wide as long, longitudinally carinate; second tergite as long as wide; basal foveae feebly striate, the striae reaching about the middle of the segment; tergites three to five equally long, unsculptured, with a row of hairs across each; six longer, broadly rounded apically, with a row of hairs around its edge; last four tergites united as long as the second; wings hyaline, extending the length of the last segment past the apex of the abdomen. Shining-black; antennae and legs piceous, the tarsi (except the last joint of each) paler.

Male.—Length 1 mm. Antennae piceous, pubescent; pedicel twice as long as wide; twice as long as the third joint; joint three spherical, as wide as the second; four about as wide as two, scarcely widened apically; joints five to ten about one and one-half times as long as wide, cylindrical; ten as long as three and four united, sharply pointed apically.

Type locality.—Manitou, Colorado.

Type.—Cat. No. 25443, U.S.N.M. Paratype in Collection Fouts.

Described from two females and one male reared by J. H. Pollock, May 4, 1916, from a *Cecidomyid* on *Pinus edulis* and recorded in the Bureau of Entomology under "Hopk. U. S. No. 13800^{e}."

This species might possibly be placed in the group having the upper part of frons aciculate. The face is not, however, aciculate, but faintly shagreened and must be observed closely before any decision is made. In the type and allotype the upper part of the face is not at all sculptured. It is only in the female paratype that shagreening of the upper part of the frons occurs.

66. PLATYGASTER ROHWERI, new species.

Female.—Length 1.3 mm. General appearance of *pini* Fouts; body elongate; thorax higher than wide; abdomen flattened; head twice as wide as long, not excavated behind, the cheeks subconvex; occiput transversely striate; cheeks aciculate above, shagreened below; interocellar area shining, not distinctly sculptured; space around ocelli indistinctly shagreened; frons mostly unsculptured, finely diagonally aciculate below; antennae elongate, not much thickened toward apex, the flagellum distinctly longer than the thorax; pedicel twice as long as wide, as long and about as wide as joint six; joint three half as long as two, very little narrower than four; four and five subequal, a little shorter and narrower than two, cylindrical; six to nine subequal, about twice as long as wide, cylindrical; ten as long as three and four united, as wide as nine, pointed, the sides on basal two-thirds parallel; thorax convex above; pronotum aciculate laterally; mesonotum mostly polished, finely shagreened anteriorly; notauli distinct on basal half of mesonotum, the median lobe broadly rounded behind; scutellum circular, convex, not so highly elevated as in *pini*, without sculpture and without pubescence above, narrowly margined laterally; abdomen the length of the last segment longer than the head and thorax united, rather strongly flattened above and below, slightly narrower than the thorax; first tergite rounded above, the median area not well defined; second tergite as wide as long, twice as wide apically as basally; interfoveal space with a few very short carinae; foveae striate, the striae reaching the middle of the segment; following tergites polished; wings hyaline, extending to the apex of the abdomen. Black; antennae and legs (except tarsi, tibiae, femora basally, and trochanters, which are brownish) piceous.

Male.—Length 1.2 mm. Antennae rather slender, dark brown in color; pedicel one and one-half times as long as wide, as wide as but distinctly shorter than, joint five; three nearly as wide as two, two-thirds as long as two, half as long as four; fourth joint wider than the second, about one-half longer than wide, moderately produced below before the apex; joints five to nine nearly twice as long as wide, as wide as the pedicel; ten as long as three and four united, conical, subacute apically; abdomen elliptical, rounded behind, a little shorter than the head and thorax united, slightly less than half as wide as long, narrower than the thorax; tergites three to seven united nearly as long as the second; wings hyaline, extending the length of the second tergite past the apex of the abdomen.

Type locality.—Hilt, California.

Other localities.—Colestin and Ashland, Oregon.

Type.—Cat. No. 25444, U.S.N.M. Three paratypes, one female and two males, in Collection Fouts.

The type series, consisting of three females and six males, was reared from the cones of *Abies concolor* and *Pinus lamburtiana.*

More concise data is given in the field notes: Hopk. U. S. 10871^{e2}, one female and three males from Hilt, California, reared, June 2, 1914, by P. D. Sergent from the cones of *Pinus lamburtiana*; Hopk. U. S. 125380^{2}, two females and one male from Colestin, Oregon, reared by J. M. Miller from the cones of *Abies concolor;* Hopk. U. S. 10833^{f3}, two males from Ashland, Oregon, 4,000 feet (1,220 meters) altitude, reared June 4, 1914, by P. D. Sergent from the cones of *Pinus lamburtiana.*

67. PLATYGASTER HUACHUCAE (Ashmead).

Polygnotus huachucae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 316.

Female.—Length 1.3 mm. Head a little over twice as wide as long, moderately emarginate behind, subconvex in front, as wide as the thorax; occiput and cheeks above with fine wavy aciculae; vertex subacute, unsculptured; interocellar area aciculate laterally; space around lateral ocelli polished; frons for the most part polished, with faint diagonal aciculae below; antennae more slender than in *vernoniae;* pedicel twice as long as wide, about as wide as joints four to six; joint three half as wide as two, a little longer than wide, nearly as long as four, which is two-thirds as long as two; joints five and six equal, slightly longer than four; seven to nine a little longer than wide, slightly wider than six; ten a little longer than three and four united, conical, subacute at tip; thorax broader than in *vernoniae,* scarcely higher than wide; pronotum laterally with fine vertically directed aciculae; mesonotum mostly polished, finely shagreened anteriorly; notauli briefly indicated, not reaching the middle of the mesonotum, the median lobe truncate posteriorly; scutellum circular, convex, polished, sparsely pubescent, narrowly margined laterally; abdomen as long as the head and thorax united, as wide as the thorax, twice as long as wide; striae on second tergite fine and extending to the middle of the segment; interfoveal area with five short striae; tergites beyond the second not sculptured, each transversed by a row of short white hairs; wings hyaline, extending the length of the last segment past the apex of the abdomen. Black; antennae and legs fuscous; pedicel, anterior tibiae apically, and all tarsi (except the last joint of each) brownish.

Male.—Length 1 mm. Antennae piceous, structurally indistinguishable from those of *vernoniae* Ashmead; abdomen spatulate, a little shorter than the head and thorax united, three-fourths as wide as long; segments three to seven united half as long as the second; wings hyaline, extending nearly the length of the second tergite past the apex of the abdomen. Legs brownish, tarsi and anterior tibiae apically, yellowish.

Type locality.—Fort Huachuca, Arizona.

Type.—Cat. No. 2296, U.S.N.M. Type male and allotype female selected.

Redescribed from the type series, twelve females and one male. This material was reared "from a Cecidomyid pod-like gall on an unknown plant, sent to the department by H. K. Morrison." Ashmead[14] says there are some specimens in the type series which were reared from a Cecidomyid stem gall on sunflower. I can not find any specimens with such data. All the type specimens in the Museum are labeled as having been reared on June 6 and 16, 1883, and bear the number "3107."

One female specimen has the reflexed plate on the side of the abdomen oblique, not horizontal, as the others have it.

68. PLATYGASTER ASTERICOLA (Ashmead).

Polygnotus astericola Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 320. Female (in part) and male.—Brues, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 518.

Female.—Length 0.8 mm. Head twice as wide as long, as wide as the thorax, slightly emarginate behind, strongly convex in front; occiput aciculate; cheeks convex, shagreened; frons polished, unsculptured except below where there are faint diagonally directed aciculae; antennae rather stout, the flagellum distinctly shorter than the thorax; pedicel twice as long as wide, as wide as joint six, but longer, as long as joint ten; joint three half as long as two, a little narrower than four; four and five subequal, as long as six but narrower; joints seven to nine as wide as long; ten conical,

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[14] Bull. 45, U. S. Nat. Mus., 1893, p. 317.

a little longer than wide, longer than nine, acutely pointed apically, its lower side straight; thorax as wide as high, moderately convex above; pronotum finely aciculate laterally; mesonotum mostly polished, finely shagreened anteriorly; notauli distinct on basal half of mesonotum, the median lobe broad and truncated posteriorly; scutellum transverse, highly convex, narrowly margined, polished, pubescent as in *vernoniae;* abdomen distinctly less than twice as long as wide, broadly elliptical, subacute apically, as wide as the thorax, a little shorter than the head and thorax united; second tergite as wide as long, not much narrowed anteriorly; striae few and not extending past the apices of the foveae; space between the foveae with a number of short carinae; last four tergites united a little over half the length of the second; tergites three and four subequal; five half as long as four; six as long as four, much wider than long, rounded apically; wings slightly infuscated, extending the length of the last four segments past the apex of the abdomen. Black; antennae and most of legs dark brown; apices of front tibiae, tibiae basally, and tarsi (except the last joint of each) yellowish in color.

Male.—Length 0.8 mm. Antennae very short, the flagellum much shorter than the thorax; pedicel one and one-half times as long as wide, a little wider than the third joint, as wide as but distinctly longer than the fourth; joint three transverse, slightly narrower than four which is a little longer than wide, not at all widened apically, in fact somewhat narrowed; five as wide as long, a little wider than four; joints six to nine distinctly transverse, as wide as five; ten a little shorter than three and four united, sharply pointed apically, the sides curved; abdomen egg-shaped, a little longer but no wider than the thorax, twice as long as wide; wings hyaline, extending a little more than the length of the last five segments united past the apex of the abdomen.

Type locality.—Holderness, New Hampshire.

Type.—Cat. No. 2300, U.S.N.M. Type male and allotype female selected.

Redescribed from the type material, four females and one male These specimens were reared May, 1884, from a Cecidomyid gall on *Aster* collected by A. Koebele.

In the male type the second tergite is more strongly striate than in the females.

69. PLATYGASTER RUBI (Ashmead).

Polygnotus rubi ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 315.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 538.

Female.—Length 1 mm. Head twice as wide as long, not emarginate behind, feebly convex in front; occiput aciculate; cheeks subconvex, finely shagreened above; vertex subacute; interocellar area polished, unsculptured; frons without sculpture except below where it is finely aciculate; flagellum about as long as the thorax; pedicel twice as long as wide, as long and as wide as joint ten which is the longest in the flagellum, a little narrower than six; joint three minute, as long as wide, distinctly narrower than four; four slightly longer than wide, as wide as, but shorter than, two; five as long as four, a little narrower; six longer than wide, a little shorter than the pedicel, longer than joints seven to nine, which are as wide as long; thorax slightly longer than wide, as wide as high, moderately convex above, as wide as the head; pronotum on the sides finely longitudinally aciculate; notauli widely separated, as long as the scutellum; median lobe truncated posteriorly; scutellum transverse, highly convex, unsculptured, finely pubescent; abdomen elliptical, more strongly narrowed posteriorly than anteriorly, as long as the head and thorax united, a little over twice as long as wide, distinctly narrower than the thorax; second tergite slightly longer than wide, three-fifths as wide anteriorly as posteriorly, the sides curved slightly near the apex; foveal striae few and extending a little beyond the middle of the segment; a short carina between the foveae as in *relativa;* tergites three to six unsculptured, united three-fifths the length of the second; three to five equally long, each traversed by a row of hairs; six distinctly longer than three and four united, wider than long, narrowly rounded posteriorly; wings hyaline, extending a little beyond the apex of the abdomen. Reddish-brown; antennae and legs brown; pedicel, anterior tibiae, and tarsi (except the last joint of each) paler touched with yellow.

Type locality.—Arlington, Virginia.

Type.—Cat. No. 2294, U.S.N.M. Type selected.

Redescribed from the two types in the National Museum. They were reared March 30, 1886, from *Cecidomyia farinosa* Osten Sacken found on blackberry. Ashmead[16] says that Prof. J. B. Smith has reared the same species from a gall on blackberry at New Brunswick, New Jersey. I have not seen the specimens and can not verify his determination.

70. PLATYGASTER RELATIVA, new species.

Platygaster astericola ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 320 (female in part).

Female.—Length 1 mm. Very closely related to *astericola* Ashmead, differing from that species in the following particulars: abdomen elliptical, a little shorter than the head and thorax united, slightly narrower than the thorax, a little over twice as long as wide; second tergite distinctly, but only very slightly, longer than wide; basal foveae long, reaching to the middle of the segment, with several faint striae extending a little beyond their apices; interfoveal area on second tergite elevated anteriorly, with a short median carina, and several inconspicuous striae to either side of it; last four tergites united three-fourths as long as the second, slightly shorter than the width of the third; sixth tergite broader than long, distinctly shorter than three and four united, subacute apically; wings hyaline, extending beyond the apex of the abdomen. Coloration as in *astericola* Ashmead.

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[16] Bull. 45, U. S. Nat. Mus., 1893, p. 315.

Type locality.—Holderness, New Hampshire.

Type.—Cat. No. 25445, U.S.N.M. Two paratypes in Collection Fouts.

Described from four female specimens originally included by Ashmead in the type series of *Platygaster astericola* and with the same ecological data.

This species differs from *variabilis* and *vernoniae* in not having the abdomen longer the head and thorax united, and from *rubi* in having the striae on the second tergite faint and not extending beyond the the middle of the segment. This character seems to be the only one separating *relativa* from *rubi* and it may be that they are synonymous in spite of their different host records.

The relative length of the wings and abdomen varies somewhat. The wings may extend the length of the last four segments or only the length of segment six past the apex of the abdomen.

71. PLATYGASTER VERNONIAE (Ashmead).

Polygnotus vernoniae ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 317.—BRUES, Bull. 22, Conn. Geol. Nat. Hist. Surv., 1916 (1917), p. 539.

Female.—Length 1 mm. Closely related to *rohweri* Fouts, but the abdomen not so elongate; head distinctly less than twice as wide as long, not emarginate behind; occiput transversely aciculate; cheeks subconvex, shagreened above; interocellar area finely aciculate; space around lateral ocelli indistinctly aciculate; frons mostly polished, with a few faint diagonally directed aciculae below; antennae short, the flagellum (including pedicel) distinctly shorter than the thorax; pedicel twice as long as wide, about as wide as joint six; joint three much narrower and less than half as long as two, two-thirds as long and a little narrower than four; four a little longer than six, not quite as wide, slightly longer and wider than five; joints seven to nine as wide as long, slightly widened apically; ten shorter than three and four united; thorax as in *rohweri*, higher than wide, strongly convex above; pronotum aciculate laterally, polished posteriorly; mesonotum mostly unsculptured, shagreened anteriorly; notauli distinct on basal half of mesonotum, widely separated behind, the median lobe broadly rounded posteriorly; scutellum transverse, strongly convex, margined laterally, polished, sparsely covered with white pubescence on the sides and above; abdomen shaped as in *rohweri* but not so elongate, a little longer than the head and thorax united, narrower than the thorax, two and one-half times as long as wide; first tergite hairless, sculptured as in *rohweri*; second tergite about as wide as long, more than half as wide anteriorly as posteriorly; basal foveae finely striate, four or five of the striae extending to the apical third of the segment; interfoveal area with numerous closely placed striae about as long as the foveae; last four tergites united shorter than the second, each traversed by a row of hairs; tergites three and four equal; five a little longer; six as long as three and four united, as wide as long, narrowly rounded apically; wings hyaline, reaching to the apex of the abdomen. Black; antennae and legs of a uniform brown color, the flagellum darker.

Male.—Length 0.8 mm. Antennae of a similar construction to that found in *rohweri* Fouts; third joint wider than long; fourth joint curved above and widened apically, wider than the pedicel; following joints about as wide as long; ten as long as the pedicel, hardly longer than wide, pointed apically, the sides rounded; abdomen more or less elliptical but rather broader basally than in related species (*rohweri*, *pini*, etc.), a little longer than the thorax, slightly more than twice as long as wide; tergites three to seven united half as long as the second; wings hyaline, extending the length of the last five segments past the apex of the abdomen. Color as a whole somewhat lighter than in the female.

Type locality.—Arlington, Virginia.

Type.—Cat. No. 2298, U.S.N.M. Type male and allotype female selected.

Redescribed from the types, three females and one male. According to Ashmead these specimens were reared June 15 and 17, 1886, from a Trypetid gall on *Vernonia noveboracensis*.

72. PLATYGASTER VARIABILIS, new species.

Female.—Length 1.3 mm. Head twice as wide as long, scarcely excavated behind, wider than the thorax, flattened in front; occiput finely striate; cheeks faintly shagreened above; interocellar area shagreened; frons polished, finely aciculate below; pedicel twice as long as wide, as wide as joint six, longer than any of the flagellar joints except the tenth; joints three to five, inclusive, subequal in width, narrower than the pedicel; three two-thirds as long as four; four longer than five, as long as six; joints seven to nine subequal in length and width, as wide as long, wider than six; ten twice as long as wide, conical, acute apically, longer than three and four united; thorax as wide as high, three-fourths as wide as long, convex above; pronotum finely shagreened laterally; mesonotum evenly convex, shining, shagreened anteriorly; notauli extremely short, much shorter than the scutellum, the median lobe narrow and truncated posteriorly; scutellum transverse, convex, broadly margined laterally, rather densely pubescent on the sides; abdomen distinctly longer than the head and thorax united, as wide as the thorax; second tergite sculptured as in *relativa*; tergites beyond the second not sculptured, each traversed by a row of short white hairs; wings hyaline, not quite attaining the apex of the abdomen. Shining black to pale brown; antennae dark brown; legs of varying shades of brown, sometimes dark and sometimes lighter, with the anterior tibiae apically and the tarsi of a paler color.

Male.—Length 1 mm. Pedicel one and one-half times as long as wide, as wide as joint five; third antennal joint nearly as wide as the pedicel, a little wider than long; four as long and as wide as the pedicel, slightly widened apically; following joints (except the tenth) rounded, not longer than wide; ten as long as three and four united, conical, sharply pointed, the sides curved; abdomen broadly elliptical, somewhat shorter than the head and thorax united, narrower than the thorax, twice as wide as long, narrowly rounded posteriorly; second tergite four-fifths as wide as long, rounded anteriorly, the sides curved; segments three to seven united less than half as long as the second; wings hyaline, extending half the length of the second tergite past the apex of the abdomen.

Type locality.—Bushberg, Missouri.

Type.—Cat. No. 25446, U.S.N.M. Eleven paratypes in Collection Fouts.

Described from 28 females and 4 males, reared by Theodore Pergande, September 21, 1876, from galls on *Solidago*.

Mr. Pergande's note reads as follows: "Found in Bushberg, Mo., on *Solidago*, Hymenopterous galls in the shape of little seedpods growing out where the seed would have been; they are about $\frac{3}{16}$ of an inch in length, round and with the ends straight; of a reddish brown color, covered with fine white hairs; in the gall there is an oval cell with mostly one, sometimes two or three larvae in it. Sept. 21, 1876. Many Hymenopterous parasites issued, mounted and marked 700P."

Since the above was written I have received a large series of specimens of *variabilis* from R. W. Leiby, of the North Carolina State Department of Agriculture. The specimens are from Raleigh, North Carolina, and were reared September 18-30, 1921, from the galls of *Rhopalomyia carolina* or *R. solidaginis* on goldenrod. Mr. Leiby expressed doubt in his letter as to the identity of the host.

The specimens in this series are all darker in color than the types. Mr. Leiby suspected that there were two species represented, since in some instances parasites issued from the host to the number of 25 and in other cases only to 2 to 4. The individuals reared in large numbers are somewhat smaller than the others but they are certainly the same species.

SPECIES OF UNCERTAIN POSITION.

PLATYGASTER ACICULATA Ashmead.

Platygaster aciculatus Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 32.

The original description is as follows:

Male.—Length 1.4 mm. Black, shining; vertex, occiput and cheeks finely shagreened; face transversely aciculated; sides of prothorax, mesonotum, mesopleura beneath the wings and the metapleura all distinctly longitudinally aciculated; the parapsides, scutellum, and the lower portion of mesopleura smooth, polished. Antennae 10-jointed, rufo-piceous; the flagellum subclavate; pedicel longer and stouter than the first and second funiclar joints together, the latter scarcely longer than thick, the following joints to the last transverse, the last short, conic. Parapsidal furrows deep, distinct. Scutellum elevated, cushion-shaped. Legs rufo-piceous, tips of anterior femora and their tibiae and the articulations of the middle legs yellowish. Wings clear hyaline, entirely devoid of pubescence. Abdomen oval, smooth, polished, the petiole not longer than thick, striated and pubescent, the second segment with some striae at base.

Type locality.—Pennsylvania.

Type.—In Berlin Museum.

Described from a single specimen labeled "Penn., Zimmerman."

This species would probably fall under the group having the scutellum shagreened and the notauli complete, although Ashmead says nothing about the sculpture of the scutellum in the description quoted above.

PLATYGASTER ANDRICIPHILA Ashmead.

(?) *Xestonotus andriciphilus* ASHMEAD, Can. Ent., vol. 19, 1887, p. 128, female.—CRESSON Syn. N. Amer. Hym., 1887, p. 249.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 266, female.

The following is Ashmead's description:

Female.—Black; face finely punctate; antennae and legs brownish-yellow. Mesonotum with two sharply defined parallel furrows. Scutellum not greatly prolonged, but subcompressed at sides. Wings hyaline.

Habitat.—Jacksonville, Florida.

Type in Collection Ashmead.

Originally described from one specimen reared from the Cynipid oak gall, *Andricus blastophagus* Ashmead.[17]

The type has been lost.

PLATYGASTER PALLIPES Say.

Platygaster pallipes SAY LeConte's Ed. Say, vol. 1, p. 383

Say's original description is as follows:

P. pallipes.—Body black; antennae fuscous, moniliform; basal joint honey yellow wings hayaline; abdomen polished, much depressed; widest near the tip and obtuse, gradually and rectilinearly a little narrowed to the base; feet whitish-yellow.

Length one-thirtieth of an inch.

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[17] Bull. 45, U. S. Nat. Mus. p. 266.

Ashmead's redescription of *pallipes*[18] is based on specimens conspecific with the paratype of *Isocybus canadensis* Provancher (see p. 11). They disagree with the description quoted above in such a remarkably way that I can not see how Ashmead could have made the mistake in identification which he did.

IX. Genus PIESTOPLEURA Foerster.

Piestopleura Foerster, Hym. Stud., Heft 2, 1856, p. 144, no. 4 (Monobasic). *Genotype.*—*Platygaster catillus* Walker (by original designation).

Catillus Foerster, Hym. Stud., Heft 2, 1856, pp. 107, 111 (Monobasic).—*Genotype.*— *Platygaster catillus* Walker (by original designation).

This genus, which has not as yet been correctly recognized outside of Europe, differs from *Leptacis* only in having the scutellum more strongly compressed. Since compression to a certain degree is common in many species of *Leptacis* the character is not so very distinctive. Still it seems best to retain the genus until intermediate forms, if there are any, are found.

Ashmead's species *maculipes*[19] is a *Leptacis* species. It has the thorax and head only slightly compressed.

X. Genus SACTOGASTER Foerster.

Sactogaster Foerster, Hym. Stud., Heft 2, 1856, pp. 108 and 113. Two species *Genotype.*—*Epimeces ventralis* Westwood.

Head traverse, the vertex subacute to rounded, the occiput margined; ocelli 3, disposed in a triangle, the lateral ones about their width from the eye margin; antennae 10-jointed in both sexes, in the female terminating in a 4-jointed club, in the male the first flagellar joint very closely joined to the second, causing the flagellum to appear 7-jointed; pedicel obconic, as long as first two flagellar joints; first four joints of flagellum cylindrical, the first joint half as long as second, the third a little shorter than first, fourth slightly larger in diameter than any of preceding, triangular; thorax ovoid, convex above, not compressed laterally, the notauli indicated basally on the mesonotum; scutellum convex, transverse, armed with a thorn at apex, bifoveated at base, covered with silvery pubescence; propodeum short, with a median divided carina, it and the metapleura covered with silvery or hoary pubescence; front wings veinless, with short cilia; legs clavate, tibial spurs 1, 1, 1; basal joint of hind tarsi more than twice as long as second.

Some explanation is needed in regard to this diagnosis. The characteristics of the female are well known and are correctly described above, but those of the male are less well known in several instances doubtful. This is due to the fact that the females are very readily recognized while the males are so easily confused with forms in closely related genera that authors have chosen to omit them in their descriptions or have not recognized them. Foerster in his diagnosis of the group contents himself with saying in regard to the male: "Das Männchen zeichnet sich dadurch aus, dass das erste Geisselglied sehr klein und mit dem zweiten innig verwachsen ist, die Geissel also wirklich unter der scharfsten Loupe nur siebengliedrig erscheint." Foerster described this character from specimens reared from *Cecidomyia pisi.*[20]

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[18] Bull. 45, U. S. Nat. Mus., 1893, p. 328.

[19] Bull. 45, U. S. Nat. Mus., 1893 'p. 265.

Keiffer says of the male[21] in his description of *Sactogaster millefolii:*

> Chez le mâle, les articles 3 et 5 sont petits, guere plus longs que gros, le 3e obconique, le 4e le plus gros de tous, deux fois aussi gros et deux fois aussi long que le 3e, fortement convexe dorsalement, droit ventralement, 6e a peine plus long et plus gros que le 5e, 7-10 grossis et formant la massue, a piene plus long que gros, avec un petiole un peu transversal, à poils aussi long que le tiers de l'epaisseur des articles, 7-9 subcylindriques, ayant de chaque côte, pres de l'extremité, une lamelle hyalines.

Species belonging to *Sactogaster* have been referred to *Platygaster* (by Walker) and to Synopeas (by Thomson). The species whose habits are known are parasitic on Cecidomyids.

TABLE TO SPECIES.

1. Last tergite three or more times longer than wide .... 2.
   Last tergite not more than twice as long as wide .... 1. **anomaliventris** Ashmead
2. Sixth tergite about three times as long as wide; third tergite slightly grooved or striate in the anterior angles .... 2. **longiventris**, new species.
   Sixth tergite five or more times longer than wide .... 3.
3. Sixth tergite about five times as long as wide; third tergite strongly shagreened. 3. **howardi** Ashmead.
   Sixth tergite a little over six times as long as wide; third tergite longitudinally striate in a band which widens on the side......... 4. **mucronata**, new species.

1. SACTOGASTER ANOMALIVENTRIS Ashmead.

Sactogaster anomaliventris ASHMEAD, Can. Ent., vol. 19, 1887, p. 130, female.—CRESSON, Synopsis of Hymenoptera, p. 249.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 285.

Female.—Length 1 mm. Head twice as wide as long, wider than the thorax, shagreened or finely reticulate all over, more coarsely so posteriorly; vertex separated from the occiput by a low rounded ridge; thoracic ratio, length 18, width 13, height 14; notauli distinct, not quite reaching the anterior margin of the mesonotum; scutellum broadly transverse, covered with short white hairs; spine short, directed backward and slightly upward; abdomen one and one-half times as long as the head and thorax united; tail as long as the second sternite; second tergite considerably narrower than the thorax, polished, as long as the thorax is wide (0.29 mm.); third tergite very narrow, transverse, polished; fourth tergite shagreened in a broad band across its median line, more than twice as long as the third, about twice as wide as long; fifth a little longer, quadrate, shagreened

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[20] Hym. Stud., Heft 2, 1856, p. 113.

[21] Broteria, Serie Zool., fasc. 13, vol. 11 1913, p. 194.

and more or less punctate as is also the fourth; sixth tergite shagreened, with a few indistinct longitudinal striae, less than twice to two and one-half times as long as wide, pointed apically; second sternite evenly rounded below and behind, indistinctly angulate above where its upper margin is visible to the apex of the second tergite, its posterior margin reaching to the apex of the fourth segment; sides of the second sternite evenly subconvex, without any deep foveae; relative proportions of the segment, length 14, width 9, height 9; wings hyaline, the anterior pair without marginal cilia. Black (tinged with an amber color in the older specimens); trochanters, apex of anterior tibiae, and all tarsi except the last joint of each, paler or yellowish; appendages as a whole very dark colored.

Type locality.—Jacksonville, Florida.

Other localities.—Hagerstown, Maryland; Cabin John, Maryland; and Carlisle, Pennsylvania.

Type.—Cat. No. 25447, U.S.N.M. Type and two paratypes.

The types, as well as other collected material, have been used in drawing up the above description. Ashmead's types are faded, so the more recently collected specimens are used in describing color characters.

The species is susceptible to more or less variation. Relative lengths and widths of the abdominal segments vary somewhat, especially of the sixth tergite. As stated in my description this segment may be two and one-half times as long as wide. In the types it is less than twice as long as wide.

The specimens from localities other than Jacksonville were collected by the author at various times (July–August, 1915–1920). I have collected the species on the leaves of wild cherry trees, poplar trees, and black locust trees.

The male specimens mentioned in Ashmead's Monograph belong to the genus *Leptacis*. Since they were not mentioned in the original description their affinities need not be indicated here. They remain undescribed.

2. SACTOGASTER LONGIVENTRIS, new species.

Female.—Length 2 mm. Head twice as wide as long when seen from above, distinctly, but not excessively, wider than high; seen from in front, feebly triangular, the angles rounded; frons strongly shagreened, more strongly so on the lower part of the face and along the inner margins of the eyes, striate and roughened just above the insertion of the antennae; bases of antennae partially covered by a long triangular spine about the length of the last antennal joint, concave above and with its lateral margins extending upward and laterally to form the margins of the antennal foveae; interocellar line twice as great as the ocellocular: ocellocular line equal to the diameter of the lateral ocellus; interocellar space, vertex and occiput more coarsely shagreened than the cheeks, with a coarser sculpture than any part of the face except in the region of transverse striations just above the bases of the antennae; occiput immargined; antennae with a distinct 4-jointed club; scape club-shaped, curved, narrowed basally, broadened medially to apically, slightly emarginate at the apex and with a thin lamellated edge on its inner margin, the lamella not apparent near the base of the scape; funicle joints densely covered with rather long white hair, club joints also covered with white hair but not so long as on the funicle; first club joint triangular, about as wide as long; second and third club joints equally long, as long as the first, broadly transverse and produced on the outside into a blunt spine; terminal joint obconical, blunted apically, one and one-half times as long as the penultimate; thorax strongly convex above; pronotum, anteriorly and superiorly, and mesonotum, shagreened; pronotum anteriorly transversed longitudinally by two small but sharply marked carinae extending almost to the suture separating the pronotum from the mesonotum; mesonotum with two short, shallow, but indistinct furrows anteriorly; notauli nearly complete, sharply indicated posteriorly; scutellum covered with white hairs; spine short and blunt, flattened above; episternum with a few arcuate striae above; pleurum sparsely hairy anteriorly, thickly so posteriorly, polished, separated from the propodeum by a high rounded ridge; propodeum except on posterior part of ridge, hairless and polished; wings slightly smoky, darker at the apical margins; abdomen about twice as long as the thorax; first tergite hairy, second strongly convex above, slightly less than twice as long as wide, with a slight median longitudinal elevation anteriorly, perfectly smooth and polished, with a few minute scattered hairs laterally; third tergite about three times as wide as long, polished except in the anterior angles where there are a few faint grooves or striae; fourth tergite quadrate, delicately shagreened and sparsely hairy, more coarsely shagreened laterally, a narrow anterior triangular space smooth and polished; fifth tergite one and one-half times as long as wide, distinctly but not sharply, ridged above, shagreened or faintly longitudinally grooved except on its extreme anterior margin and a rather narrow border posteriorly; sixth tergite about as long as the two preceding, narrowed from apical one-third to an acute point from which issues the ovipositor, longitudinally striate except at extreme base and apical one-fourth; second sternite a little longer than the thorax broadly rounded below and behind, orbicular, curving upward behind till one can perceive an aperture extending to the apex of sternite three, against the base of which it fits tightly; in the upper part of this segment on each side just a little anterior to the middle is a deep smooth wide pit of a similar shape to that made by *Myrmelion* in the sand, except that its side is a little steeper anteriorly; four or five grooves run out of this pit and extend in a short curve posteriorly. Black; mandibles, base of scape, anterior tibiae, and all tarsi yellow; scape apically and front legs, except parts mentioned above, brownish; rest of legs and antennae piceous.

Described from one specimen collected at Cabin John, Maryland, by the author on May 20, 1917. No ecological data are available. The specimen was probably collected while sweeping in the forest.

The type is in the author's collection.

This species is easily separated from all of our described species of *Sactogaster*. The length of the abdominal "tail" distinguishes it from all except *howardii*.

8. SACTOGASTER HOWARDII Ashmead.

Sactogaster howardii ASHMEAD, Can. Ent., vol. 20, 1888; Bull. 45, U. S. Nat. Mus., 1893, p. 285.

Female.—Length 2.4 mm. Head about the same shape as in *mucronata* Fouts, about twice as wide as long seen from above, rather full behind the eyes, in front feebly convex; broadly rounded on the sides; seen from in front the head is more or less hexagonal, about as wide as high, the part of the head over the eyes dome-shaped and half as high as the eyes are long, projecting above the eyes about as far as head projects below the eyes; vertex rather acute, rolled up into a ridge which extends laterally a little beyond the lateral ocellus; projection between antennae as in *mucronata* Fouts; head and thorax, except pleurae, lower part of pronotum and the venter, finely and evenly shagreened as in *mucronata;* fourth antennal joint about twice as long as wide; notauli nearly complete, faint anteriorly; wings hyaline; tail of abdomen one-tenth longer than the length of the body preceding it; second sternite about twice as long as wide when viewed laterally, extending to apex of second segment, rounded below and apically and flattened above, made to appear like a thick hook by the incision which penetrates to the circular depression at its middle; second tergite rather strongly shagreened on its apical fourth, otherwise smooth and shining, remaining tergites strongly shagreened with indications of diagonal striations; third tergite about twice as wide as long, one-third shorter than the fourth which is a little longer than wide; fifth tergite as long as the sixth which is three times as long as wide and pointed apically; sides of the sixth parallel to the apical third of the segment. Black; scape, pedicel, funicle, anterior and middle trochanters, front legs (except coxae and last tarsal joint), middle and posterior tibiae at their basal half, and tarsi (except terminal joints) yellow or yellowish brown;

abdomen (more particularly the unsculptured second tergite and sternite), coxae, middle and posterior femora, and tibiae on apical half, amber-colored to dark brown.

Type locality.—Washington, District of Columbia.

Type.—No. 25448, U.S.N.M.

Described from the type specimen.

4. SACTOGASTER MUCRONATA, new species.

Female.—Length 2 mm. Face, cheeks, vertex and occiput finely and evenly shagreened; vertex rounded, not acute; projection between antennae narrow, subacute at apex: third antennal joint slightly shorter and a little narrower than fourth which is about twice as long as wide; fifth and sixth antennal joints subequal, nodose, about as wide as the fourth; mesonotum and upper part of pronotum finely shagreened; remainder of thorax (except scutellum) smooth and shining; notaüli extending slightly anterior to the middle of the mesonotum; spine on scutellum short, straight; wings hyaline; first tergite very short, hardly visible beneath a ring of silvery hair which extends upon the second tergite; second sternite extending to the apex of the third segment; fourth tergite one and one-half times as long as the third, a little less than twice as long as wide, finely longitudinally striate except at extreme apex; second tergite not at all sculptured; third quadrate, longitudinally striate in a transverse band which widens on the side; fifth tergite about as long as the two preceding, a little over three times as long as wide, finely longitudinally striate all over; sixth tergite about as long as the three preceding, a little over six times as long as wide, slightly swollen just before the apex and subacute at tip, finely longitudinally striate except at and near the apex; third to last segment inclusive as long as rest of body. Black; shining brilliantly under a strong light; base of scape, trochanters, anterior tibiae (except at middle), tibiae of middle and posterior legs at extreme bases, and all tarsi (except last joint of each), amber colored.

Type.—Cat. No. 25449, U.S.N.M. Type and paratype. Paratypes in author's collection.

Type locality.—Carlisle, Pennsylvania.

Described from five specimens collected by the author. Two specimens were collected July 16, 1920, on the leaves of a mulberry tree. The other three were collected July 16 and 27 on the leaves of a wild cherry tree within a few feet of the mulberry tree just referred to.

This species comes closest to *howardii* of Ashmead. It is, however, very readily distinguished from that species by the color of the scape and by the sculpture and structure of the abdomen, characters used in the key to the species.

In these two forms, *mucronata* and *howardii* we have extreme elongation of the tail of the abdomen. In no other described species from North America does the tail of the abdomen equal in length the body anterior to its base.

Some of the characters described above are not constant. It seems that the proportion of the last segment to the three preceding is rather fixed, but the length of this segment in proportion to its width varies greatly, the segment being in some instances a little over five times, and in others slightly more than six and one-half times as long as wide. The two paratypes which have the former proportion are also shorter in their entire length than the paratype with the more elongate sixth segment. The smaller specimens measure 1.5 mm. from the front of head to the tip of the sixth segment. The type and the remaining paratype are of about the same size and proportion as the larger paratype mentioned above.

SPECIES OF UNCERTAIN POSITION.

SACTOGASTER VARIPES Harrington.

Sactogaster varipes HARRINGTON, Trans. Royal Soc. Canada, vol. 5, 1900, p. 190.

The original description is as follows:

> *Female.*—Length 0.7 mm. Black microscopically punctate. Legs piceous, base of tibiae and tarsi yellowish. Scape of antennae pale. Scutellum with sharp awl-like spine; sides of metathorax and base of abdomen with silvery pubescence. Terminal segments of abdomen forming deflexed tail, which is shorter than second segment; second segment polished, terminal segment finely punctulate.
>
> *Male.*—Closely resembles female except in shape of abdomen and antennae.
>
> Described from one female and one male taken in August, Hull. The female very closely resembles S. *anomaliventris*, except in the shape of the second ventral segment which is much flatter.

Descriptions must be particularly accurate in this group to be of any value in identification. The one just quoted is not of much use.

XI. Genus LEPTACIS Foerster.

Leptacis FOERSTER, Hym. Stud., Heft 2, 1856, pp. 107, 112 (four species). *Genotype.—Platygaster tipulae* Kirby. (By original designation.)

Ectadius FOERSTER, Hym. Stud., Heft 2, 1856, pp. 108, 113, 144. (Monobasic.) *Genotype.—Platygaster craterus* Walker. (By original designation.)

Synopeas FOERSTER, Hym. Stud., Heft 2, 1856, pp. 108, 114 (sixteen species). *Genotype.—Platygaster sosis* Walker. (By original designation.)

Anopedias FOERSTER, Hym. Stud., Heft 2, 1856, pp. 108, 114. No species originally included.

Ceratacis THOMSON, Ofvers Svensk. Vet.-Akad. Forh., Heft 16, 1859, pp. 69, 78. (Monobasic.) *Genotype.—Ceratacis flavipes* Thomson. (By original designation.)

Dolichotrypes CRAWFORD and BRADLEY. Proc. Ent. Soc. Wash., vol. 13, 1911, p. 124. (Monobasic.) *Genotype.—Dolichotrypes hopkinsi* Crawford and Bradley. (By original designation.)

I have seen types only of the genus *Dolichotrypes*. All synonomy is therefore based on a study of the original description and of identified specimens in my own and in the National Collection.

Species which belong to *Leptacis* have been referred to *Psilus* (by Spinola), to *Platygaster* (by Haliday, Walker, Curtis, and Taschenburg), to *Ichneumon* (by W. Kirby), to *Synopeas* (by Thomson), to *Ceraphron* (by Say), to *Piestopleura* (by Ashmead), and to *Amblyaspis* (by Ashmead and Brues). More exact data on this matter can be obtained by consulting volume five of Dalla Torre's Catalogus Hymenopterorum. In studying our fauna the notes given above will suffice.

Synopeas is really inseparable from *Leptacis* although many species can be placed definitely in one genus or the other by the use of Foerster's generic key[22] and the descriptions following it. I have numerous specimens in my own collection showing transition in the structure of the scutellum. Typical *Synopeas* Foerster has the scutellum broad and depressed basally, with a short thorn at tip. Considerable difference is found in typical forms of *Leptacis* Foerster where the scutellum is elongate and produced into a long acute spine posteriorly.

The presence of a low and flat scutellum is the only character used by Foerster to separate *Anopedias* from related genera (*Synopeas*, *Leptacis*, etc.). Variation in scutellar structure seems to be of no generic value throughout the entire subfamily. *Leptacis striatifrons* Ashmead, undoubtedly a true *Leptacis* species, runs to *Anopedias* in Foerster's generic key.[23]

Ectadius of Foerster includes forms which, except in the elongation of the abdomen in the female sex, are typical of *Synopeas* Foerster. *Dolichotrypes* runs to *Ectadius* in Foerster's generic key[24] and agrees with Foerster's description on page 113.

Species should agree in every particular with the following diagnosis before they are assigned to the genus *Leptacis:*

Head transverse; lateral ocelli nearer the eye margin than to the anterior ocellus; antennae 10-jointed in both sexes, in the female with a more or less distinct 4-jointed club; in the male the antennae may be covered with long or short erect hairs, and may have the fourth joint excavated basally, or swollen medially without any excavation, or cylindrical; mandibles bidentate, the teeth equal; thorax usually more or less compressed, frequently elongate; notauli incomplete or complete; scutellum usually with a spine or tubercle at apex, flat or convex, either wide or narrow at the base; wings veinless, pubescent, ciliate at the margins; abdomen in both sexes convex above and below, not flattened as in *Platygaster;* abdomen in the female as short as the thorax to many times as long as the head and thorax united; first tergite short, covered with white pubescence; second tergite the longest, with white pubescence basally, without foveae unless they are minute and obscured with hairs.

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[22] Hym. Stud., Heft. 2, 1856, p. 108. [23] Idem. [24] Idem., p. 107.

TABLE TO SPECIES.

1. Scutellum more or less elongate, usually produced posteriorly into a spine; if the spine is short and tubercle-like it forms always a continuation of the upper surface of the scutellum .... 2.
   Scutellum short, widened basally, with a tubercle (rarely absent) at apex; the tubercle projects upward to a certain extent and has the appearance of being attached to the scutellum, not prolonging its dorsal surface .... 10.
2. Spine absent or shorter than the rest of the scutellum .... 3.
   Spine longer than the rest of the scutellum .... 7.
3. Spine absent, the scutellum perpendicular behind .... 1. **striatifrons** Ashmead.
   Spine present .... 4.
4. Body yellowish or rufous in color .... 5.
   Body shining black .... 6.
5. Thorax about twice as long as wide, rather strongly compressed.
   2. **maculipes** (Ashmead).
   Thorax less than twice as long as wide, not particularly compressed
   3. **minuta** (Ashmead).
6. Legs mostly shining black .... 4. **pennsylvanica**, new species.
   Legs mostly lighter colored .... 5. **pallipes**, new species.
7. Abdomen wider than the thorax .... 6. **americana** (Ashmead).
   Abdomen about as wide as thorax .... 8.
8. Fourth antennal joint longer than the second and third united (males) ..... 9.
   Fourth antennal joint shorter than the second and third united. Pedicel not twice as wide as the third joint .... 7. **rugiceps** (Ashmead).
   Pedicel more than twice as wide as the the third joint .. 8. **puncticeps** Ashmead.
9. Antennal joints four and five united longer than joints three and four.
   9. **gahani**, new species.
   Antennal joints four and five united as long as the fourth.
   10. **longipes** (Ashmead).
10. Notauli complete .... 11.
    Notauli incomplete .... 13.
11. Frons rough, transversely rugose .... 11. **ashmeadi**, new name.
    Frons smooth, shagreened .... 12.
12. Abdomen in female many times as long as the head and thorax united.
    12. **hopkinsi** (Crawford and Bradley).
    Abdomen in female about as long as the head and thorax united.
    13. **punctata** Ashmead.
13. Mesonotum protuberant in front of the scutellum .... 14.
    Mesonotum flattened in front of the scutellum .... 17.
14. Abdomen in female considerably longer than the head and thorax united.
    14. **longiventris** Ashmead.
    Abdomen in female not longer than the head and thorax united .... 15.
15. Wings tinged with brown .... 15. **flavicornis** Ashmead.
    Wings hyaline .... 16.
16. Spine of scutellum moderately long, directed upward; area on either side of mesonotal lobe densely pubescent .... 16. **cynipsiphila** Ashmead.
    Spine of scutellum very short, a mere protuberance; area on either side of mesonotal lobe not so densely pubescent .... 17. **globata**, new species

17. Antennae with a club (females).................................... 18.
Antennae without a club (males).................................... 24.

18. Scape bright yellow or reddish yellow.................................... 19.
Scape tinged with brown or piceous.................................... 20.

19. Abdomen longer than the head and thorax united, narrowed tail-like beyond the second segment.................................... 18. **auripes** (Ashmead).
Abdomen not longer than the head and thorax united, not tail-like apically.
19. **incerta** (Ashmead).

20. Abdomen longer than the head and thorax united.... 20. **inermis** (Ashmead).
Abdomen not longer than the head and thorax united.................................... 21.

21. Mesonotum more or less flattened in front of the scutellum.................................... 22.
Mesonotum highly convex; length of body 1.10 mm. 21. **ruficapa** (Ashmead).

22. Notauli absent.................................... 23.
Notauli present, reaching nearly to the anterior margin of the mesonotum.
22. **bradleyi**, new species.

23. Frons reticulate.................................... 23. **breviventris** (Ashmead).
Frons transversely aciculate.................................... 24. **aciculata**, new species.

24. Scape yellow or reddish-yellow.................................... 25.
Scape brown or fuscous for the most part.................................... 26.

25. Fourth antennal joint wider than joints eight, nine, or ten.
21. **ruficapa** (Ashmead).
Fourth joint narrower than joints eight, nine or ten..24. **aciculata**, new species.

26. Thorax rather long and narrow; notauli nearly complete..25. **floridana** (Ashmead).
Thorax shorter, notauli absent.................................... 27.

27. Abdomen longer than the thorax, twice as long as wide.
26. **pubescens** (Ashmead).
Abdomen shorter than the thorax, less than twice as long as wide.
24. **aciculata**, new species.

1. LEPTACIS STRIATIFRONS Ashmead.

Plate 1, fig. 1.

Leptacis striatifrons Ashmead, Bull. 45, U. S. Nat. Mus., 1893, p. 273.

Female.—Length 1.20 mm. Frons shining, with many transverse carinae, some of which are curved and in some cases incomplete; vertex separated from the occiput by a high, sharp carina which touches the posterior eye margin; occiput shagreened, with an inconspicuous interrupted, transverse carina midway; thorax more or less elongate, higher than wide, strongly convex above; pronotum and mesonotum finely shagreened, pubescent; notauli absent; mesonotum with an inconspicuous median lobe posteriorly, on each side of which is a row of white hairs projecting over the scutellar fovea; scutellum triangular seen from above, abruptly narrowed behind the middle; upper surface of scutellum flat, making a right angle with the posterior face which is perpendicular; scutellum laterally densely covered with long silvery hairs; abdomen as long as the thorax, elliptical, twice as long as wide; second tergite a trifle longer than wide, polished; last tergite as long as four and five united, wider than long, shagreened; wings with a short fringe, subhyaline, shining black; antenna (except club), front and middle legs entirely, and tarsi of hind legs golden yellow; antennal club and coxae piceous; trochanters, femora and tibiae (of hind legs) brown.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25450, U.S.N.M.

Redescribed from the type specimen.

2. LEPTACIS MACULIPES (Ashmead).

Plate 1, fig. 2.

Catillus maculipes ASHMEAD, Can. Ent., vol. 19, 1887, p. 128.—CRESSON, Syn. of N. Amer. Hym., 1887, p. 249.

Piestopleura maculipes ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 265.

Female.—Length 0.70 mm. Rather slender; head wider than the thorax; thorax compressed, strongly convex above; frons shagreened, convex, shining and with transverse striae below; vertex bordered posteriorly by a high, sharp carina; occiput smooth, finely shagreened; mesonotum convex, truncated posteriorly; notauli absent; scutellar fovea hard to find; median lobe of mesonotum touching the upper surface of the scutellum; scutellum triangular, flat and sparsely pubescent above, with its upper surface prolonged into a short spine-like projection; scutellum with a few silvery hairs laterally; abdomen as long as the head and thorax united, elliptical, a little over twice as long as wide, convex above and below; second tergite as wide as long, not sculptured apically; last four tergites unsculptured, united nearly as long as the second; tergites three to five subequal in length, united as long as six; sixth tergite as long as wide, subacute apically; wings narrowly fringed, subhyaline. Mahogany color, the antennae and legs yellowish brown.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25451, U.S.N.M.

Redescribed from the type specimen.

3. LEPTACIS MINUTA (Ashmead).

Plate 1, fig. 3.

Amblyaspis minutus ASHMEAD, Bull. 45, U. S. Nat Mus., 1893, p. 269.—BRUES, Connecticut State Geol. Nat. Hist. Surv., Bull. No. 22, 1916 (1917), p. 532.

Female.—Length 0.80 mm. Frons shining, faintly shagreened, without a median impressed line, not striate above the antennae; head seen from in front wider than high, strongly rounded above; vertex separated from the occiput by a low but sharp carina; occiput flat, polished; thorax slightly narrower than the head, two-thirds as wide as long, convex dorsally, shining, with fine sculpture above; mesonotum truncate behind, without a median lobe, its posterior edge touching the scutellum, thereby practically obliterating the scutellar fovea; notauli absent; scutellum narrow, convex above, polished, pubescent laterally, produced apically into a spine which reaches as far as the base of the first abdominal segment; abdomen slightly wider than the thorax, two-thirds as wide as long, strongly convex above and below; second tergite as wide as long, polished, narrowly pubescent basally; last four tergites united one-fourth as long as the second, becoming abruptly narrowed apically; tergites three to five subequal, very short, apparently unsculptured; sixth tergite as long as four and five united, broadly transverse, subacute apically; wings hyaline, with long fringes of cilia at their margins. Reddish brown; antenna, except club, mandibles and legs, yellow; antennal club brown.

Type locality.—Washington, District of Columbia.

Paratype-locality.—St. Louis, Missouri.

Type.—Cat. No. 2268, U.S.N.M. Type selected.

Host.—*Cecidomyia*, species in squash.

Redescribed from type material, eight females, in the United States National Museum. Types from Washington were not found in the collection.

4. LEPTACIS PENNSYLVANICA, new species.

Plate 1, fig. 4.

Female.—Length 0.80 mm. Elongate, with the thorax strongly compressed; head wider than the thorax, twice as wide as long, attached rather low on the prothorax; frons shining, aciculate, striate above the antennae; head seen from in front scarcely wider than high, flattened above; vertex bordered posteriorly by a sharp carinae; occiput faintly shagreened; thorax strongly convex above, more or less arched, over twice as long as wide, pubescent and finely shagreened dorsally; mesonotum truncated apically, its margin projecting over the base of the scutellum; scutellar fovea absent; notauli absent; scutellum shaped as in *minutus* but with the spine truncate apically and with the posterior face of the scutellum perpendicular, forming a right angle with the lower surface of the spine; abdomen a little wider than the thorax, as long as the head and thorax united, elliptical, strongly convex above and below, about twice as long as wide; second tergite two-thirds as wide as long, polished, narrowly pubescent at base; last four tergites united half as long as the second, polished; tergites three to five subequal, longer than in *minutus;* sixth tergite as long as four and five united, transverse, rounded apically; wings hyaline, with long cilia. Shining black; proximal half of scape, trochanters, front tibae, all tarsi (except last joint of each), middle and posterior tibiae basally, yellowish; middle and hind tibiae for the most part, and the last joint of each tarsus, light brown.

Type locality.—Carlisle, Pennsylvania.

Type.—Cat. No. 25452, U.S.N.M. Nine paratypes in Collection Fouts.

Described from sixteen female specimens collected by the author on the flowers and flower buds of milkweed. The dates of collection range from the 1st to the 21st of July. Eight specimens were collected on July 1, 1918; one on July 2, 1918; and seven on July 21, 1920.

5. LEPTACIS PALLIPES, new species.

Female.—Length 0.90 mm. Body moderately robust, entirely polished except for the anterior dorsal surface of the thorax and for the vertex; head lenticular, seen from above twice as wide as long, slightly wider than the thorax; frons, occiput, and cheeks without visible sculpture; antennae nearly bare, the pubescence obscure; thorax convex above, slightly higher than wide, less than twice as long as wide; mesonotum slightly excavated and hairy on each side of a narrow lobe which touches the base of the scutellum; scutellum about one and one-half times as long as wide, triangular, sharply pointed at the narrow angle, sparsely pubescent, arched; seen from the side the upper surface continues that of the mesonotum and is nearly straight; the spine projects apically as far as the base of the first abdominal segment, is as long as the propodeum and thickens rapidly proximad; the spine moreover, is a little less than one-half tho the length of the rest of the scutellum, its lower part transparent; abdomen as wide as the head, slightly longer than the thorax, strongly convex above and below, broadly ovate in outline, two-thirds as wide as long; first tergite entirely, and second narrowly at base, sparsely pubescent; second tergite as wide as long, four times as long as the following segments united; terminal tergites broadly transverse, faintly shagreened medially; sides of the abdomen regularly curved; wings hyaline, with long cilia apically, extending nearly the length of the thorax past the apex of the abdomen. Shining black; scape, pedicel and legs, except posterior femora and tibiae apically, which are infuscated, yellow; antennae dark brown; last joint of each tarsus piceous.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 25453, U. S. N. M. Paratype in the author's collection.

Described from two female specimens collected by the author, June 21 and August 6, 1917 (type), on the leaves of a Catalpa tree.

6. LEPTACIS AMERICANA (Ashmead).

Plate 1, fig. 6.

Amblyaspis americanus ASHMEAD, Can. Ent., vol. 19, 1887, p. 129.—CRESSON Syn. N. Am. Hym., 1887, p. 249.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 269.

Female.—Length 1 mm. Very similar to *longipes* from which it differs as follows: Mesonotum squarely excised posteriorly, without a lobe projecting upon the base of the scutellum; spine of scutellum not sharply pointed apically, seen from the side not much narrowed toward the base; abdomen wider than the thorax, two-thirds as wide as long; second tergite as wide as long; wings projecting the length of the second tergite past the apex of the abdomen. Shining black; legs golden-yellow; posterior femora distally slightly, and the tibiae distally, strongly infuscated; tarsi stramineous.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25454, U.S.N.M.

Redescribed from the type specimen.

7. LEPTACIS RUGICEPS (Ashmead).

Plate 1, fig. 9.

Amblyaspis rugiceps ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 269.

Male.—Of much the same appearance as the three preceding species; head distinctly wider than the thorax; frons rugose, traversed by numerous carinae, the latter interrupted medially below the ocelli; vertex separated from the occiput by a high, sharp ridge; occiput finely reticulate; antennae attenuate; hairs on the flagellum not as long as the joints are wide; thorax two-thirds as wide as long, slightly higher than wide, polished, pubescent above; mesonotum pubescent on either side of a short truncate lobe which touches the base of the scutellum; notauli absent; scutellum short, wider than long (not counting the spine which is highly elevated and extends to the base of the first abdominal segment); the spine is as long as the rest of scutellum and is nearly straight, parallel with the dorsal surface of propodum; posterior face of the scutellum perpendicular, making a right angle with the lower surface of the spine; abdomen as long as the thorax, nearly twice as long as wide, elliptical; second tergite as wide as long; polished; following segments narrow, subequal, the last a little longer than any of the others; wings hyaline, extending nearly the length of the abdomen past its apex, with cilia of moderate length on their margins. Shining black; legs and antennae stramineous; apical half of the flagellum brown.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 25455, U.S.N.M.

Redescribed from the type specimen.

8. LEPTACIS PUNCTICEPS Ashmead.

Leptacis puncticeps ASHMEAD Bull. 45, U. S. Nat. Mus., 1893, p. 275.

Male.—Length 1 mm. Head distinctly less than twice as wide as long, full behind the eyes, wider than the thorax, finely reticulate (more strongly so on the occiput and cheeks); frons shining, faintly reticulate; lateral ocelli nearly touching the eye margin; vertex separated from the occiput by a rounded elevation; scape as long as the following five joints united, a little thicker than the pedicel, not strongly curved; pedicel twice as long as wide, piriform, strongly narrowed basally; third joint about half as long and less than half as thick as the pedicel, twice as long as wide, as long as but narrower than joint four; four less than twice as long as wide, narrower and shorter than the pedicel; joints five and six subequal, one and one-half times as long as wide, as long as but narrower than the fourth;

joints seven to nine subequal, cylindrical, one and one-half times as long as wide, ten twice as long as wide, pointed apically, as wide as nine; thoracic ratio: Length 20, width 12, height 14; thorax convex above, entirely polished and without sculpture; notauli short, nearly parallel; scutellum (not counting the spine) transverse, ridgelike, rather thickly pubescent, its posterior face perpendicular; spine long and thin, rodlike, extending straight backwards as far as the apex of the propodeum; abdomen as long as the thorax, elliptical behind the first segment, twice as long as wide, as wide as the thorax, highly polished; second tergite longer than wide, strongly narrowed anteriorly; following segments short, transverse; wings brownish, pubescent, with long marginal cilia, as long as the head, thorax, and abdomen united. Shining black; antennae yellow, the last four joints brown; legs mostly reddish-yellow, the hind femora and tibiae apically fuscous; spine of scutellum, propodeum and first abdominal segment, yellowish.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25470, U.S.N.M.

Other locality.—Carlisle, Pennsylvania.

Redescribed from the type and from a male specimen collected by the author at Carlisle (July 2, 1918).

9. LEPTACIS GAHANI, new species.

Plate 1, figs. 7, 8.

Female.—Length 1.20 mm. Closely related to *americana* from which it differs only in the slightly narrower abdomen. I have vainly sought further differences. Perhaps the males would be more useful in this connection but unfortunately I have no males of *americana*. The figure illustrating the antennae of the female type is equally applicable to *americana*.

Male.—Length 1.20 mm. Differs little from the female. Antennae long and slender, with nodes between joints seven to ten; flagellum covered with erect whitish hairs about two and one-half times as long as the joints are wide; abdomen about as long as the thorax, spatulate, two-thirds as wide as long.

Type locality.—Glen Echo, Maryland.

Type.—Cat. No. 25456, U.S.N.M. Three paratypes in the author's collection

Described from seven specimens, one female and six males, collected by the author, July 15, 1919, on the leaves of *Cercis canadensis* Linnaeus.

This species is named after my friend, A. B. Gahan, a recognized authority on Parasitic Hymenoptera.

10. LEPTACIS LONGIPES (Ashmead).

Plate 1, fig. 5.

Amblyaspis longipes Ashmead, Can. Ent., vol. 19, 1887. p. 128.—Cresson Syn. N. Amer. Hym., 1887, p. 249.—Ashmead, Bull. 45, U.S. Nat. Mus., 1893, p. 270 (pl. 11, fig. 10, male).

Male.—Length 1.60 mm. Robust; polished except for the parts mentioned below; head less than twice as wide as long, deep behind the eyes, the cheeks wide, oblique; frons, vertex, and occiput finely shagreened; thorax shaped much as in *pallipes*, four-sevenths time as long as wide, a little higher than wide, as wide as the head; mesonotum convex above, finely shagreened, constructed posteriorly as in *pallipes;* scutellum long, highly elevated, the sides steep, the upper surface practically straight; spine acuminate, projecting well beyond the base of the first tergite, longer than the rest of the scutellum, seen from the side gradually widening basally; legs very long and stout, of a golden-yellow color, the tarsi stramineous; abdomen as long and as wide as the thorax, two-thirds as wide as long, ovate, rounded posteriorly; first tergite less than twice as wide as long, pubescent only on the sides, one-third as long as the second; second tergite a little longer than wide, rather strongly narrowed basally where there are two small patches of silvery pubescence in the places assumed by foveae in *Platy gaster* and *Trichacis;* second tergite and those following it with a narrow shagreened band along their distal margins; tergites three to seven very short, the seventh scarcely shorter than sixth, faintly shagreened; wings hyaline, with the cilia matted, extending five-sixths the length of the abdomen past its apex. Shining black, scape, legs, and spine of scutellum, golden yellow; rest of antenna dark brown.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25457, U.S.N.M.

Redescribed from the type specimen.

Ashmead's figure (pl. 11, fig. 10) is of no value. I do not know where he got his figure of the female antenna since there was never any female described. In this connection it may be well to say that the only use that can be made of Ashmead's figures in his monograph is to obtain some conception of the habitus of the various genera described therein. The figures are not sufficiently accurate to be useful in specific identification.

11. LEPTACIS ASHMEADI, new name.

Leptacis rugiceps Ashmead, Bull. 45, U.S. Nat. Mus., 1893, p. 272, pl. 12, fig. 1, female only. (Not (*Amblyaspis*) *Leptacis rugiceps* Ashmead, same reference, p. 269.)

Female.—Length 1.20 mm. Moderately robust; head rather large and thick, a little wider than the thorax, its length to its width as 10 is to 17; frons roughened, transversely rugulose, with a median carina, which, although prominent and sharp below the middle, is obsolescent above; vertex and occiput shagreened, the former with a rougher sculpture, not separated from the latter by a sharp ridge; cheeks subconvex, finely reticulate; antennae finely pubescent; thorox three-fifths as wide as long, slightly higher than wide, shagreened, more coarsely so on the pronotum; notauli complete, meeting in a point posteriorly; mesonotum evenly shagreened; median lobe projecting partly over the scutellar fovea, subacute; lateral lobes not so near the scutellum, with a scanty fringe of white hairs extending posteriorly and touching the scutellum; scutellum broad and more or less depressed, wider than long (not counting the length of the spine which is slightly recurved, as long as the rest of the scutellum); abdomen not quite as long but approximately as wide as the thorax, obvate, two-thirds as wide as long; second tergite as wide as long, without visible sculpture; following segments broadly transverse, polished; wings hyaline, without marginal cilia, extending nearly the length of the abdomen past its apex. Black; antennal club, coxae, femora and hind tibiae, except at base, dark brown or piceous; rest of appendages yellowish-brown.

Type locality.—Jacksonville, Florida.

Paratype locality.—Arlington, Virginia.

Type.—Cat. No. 25458, U.S.N.M.

Redescribed from the type specimen. I have been unable to find any Jacksonville specimens marked "type" in the national collection and have chosen a paratype female from Arlington, Virginia, as lectotype. The male mentioned by Ashmead in the original description and figured on plate 12 of his Monograph represents a new species of *Leptacis*.

12. LEPTACIS HOPKINSI (Crawford and Bradley).

Dolichotrypes hopkinsi Crawford and Bradley, Proc. Ent. Soc. Wash., vol. 13, 1911, p. 124 pl. 8 (female only).

Female.—Length 4.5 mm. The original description and figure accompanying it make this species easy to identify. The following diagnosis will help in determining the species: Mostly smooth and highly polished. Length of the thorax 0.49 mm.; of the abdomen 3.99; of the first segment of the abdomen 0.41 mm.; of the second 0.1 mm.; of the third 0.73 mm.; of the fourth 1.43 mm.; of the fifth 0.32 mm. The segments composing the tail are more or less opaque, a condition due to a kind of fine sculpture on them.

The lengths given above will of course vary within certain limits but the proportions remain fairly constant.

Male.--The male types for this species are females and represent a new species of *Leptacis*. See *Leptacis bradleyi*, new species.

Type locality.—West Virginia.

Type.—Cat. No. 13829, U.S.N.M.

Descriptions based on the type material, six female specimens, located in the collection of the National Museum at Washington.

It was not surprising that this remarkable species should have been wrongly placed. At first sight it seems to differ greatly from other described species, as indeed it does. However, when the student compares *hopkinsi* with species such as *Leptacis auripes* (Ashmead) he will see that the differences concern themselves with proportions only. The general principle of elongation is present the same as it is in *Platygaster*.

The habits, so far as known, are discussed in the original description. Professor Comstock found many specimens on a newly cut oak stump near Falls Creek, New York. They were inserting the slender part of the abdomen into the intercellular spaces of the wood near the bark.

12. LEPTACIS PUNCTATA Ashmead.

Leptacis punctatus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 272.

Female.—Length 1 mm. Head a trifle wider than the thorax, not quite twice as wide as long, finely granulose (as is also the thorax except on the pleural sclerites); frons flattened or subconvex, with or without a delicate median furrow, with a low ridge between the antennae; vertex highly elevated behind, separated from the occiput by a high sharp ridge; occiput finely reticulate, not so strongly sculptured as the frons; thorax convex above, higher than wide, nearly three-fifths as wide as long; notauli complete, converging to a sharp point posteriorly; mesonotum constructed as in *ashmeadi* Fouts; scutellum evenly rounded above, wider than long; spine as a long as, or slightly shorter than, the rest of the scutellum, nearly straight or decidedly recurved, acute at apex; abdomen shorter than the thorax to as long as the head and thorax united, narrower than the thorax, elliptical, two-thirds as wide as long to half as wide as long, sometimes flattened above and below posterior to the second segment; second tergite as wide as long, polished; following tergites transverse, of variable length, depending on whether they are retracted or extended, sometimes when united two-thirds as long as the second, polished; sixth tergite scarcely wider than long to much wider than long; pointed apically, nearly as long as the two preceding united; wings tinged with brown or hyaline, the anterior ones without marginal cilia. Black; scape, funicle, anterior and middle legs (except the coxae of both and sometimes part of the tibiae and femora of the latter), bases of tibiae and the tarsi completely, yellowish brown or golden colored.

Type locality.—Jacksonville, Florida.

Paratype locality.—Arlington, Virginia.

Type.—Cat. No. 25459, U.S.N.M.

Redescribed from the type series, four females, in the National Museum. No males were found in the type material and since this sex was not described by Ashmead, but only listed, I do not take the trouble to mention it above. It is probable that the specimen from Washington, if there was any, was the male type.

The species is variable as the description shows. The sculpture of the face varies and the relative length of the abdomen changes as the posterior segments are extended or retracted. The color varies somewhat also. One specimen has the legs mostly golden-yellow with the hind legs infuscated in part.

14. LEPTACIS LONGIVENTRIS Ashmead.

Plate 1, fig. 10.

Leptacis longiventris ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 273.

Female.—Length 1.20 mm. Head wider than the thorax, twice as wide as long, slightly emarginate behind; head and thorax, except pleural plates and mesonotal knob, shining, finely and irregularly aciculate; vertex rounded behind, separated from the occiput by an inconspicuous carina; lateral ocelli their diameter from the eye margin; thorax two-thirds as wide as long, convex above, distinctly higher than wide, nearly as high as long; notauli absent; mesonotum with a polished, slightly elevated protuberance, just in front of the scutellum; on either side of the protuberance the margin is obliquely incised and pubescent; scutellum convex, transverse, with a minute spine apically; abdomen one and two-fifths times as long as the head and thorax united, shaped somewhat as in the females of the genus *Eurytoma*, deeper below the lateral carina than above it, elliptical when seen from the side, nearly three times as long as wide, higher than the thorax; second tergite twice as long as wide, strongly convex, polished (as is also the rest of the abomen except the last tergite); tergites three–five short, tranverse, subequal; sixth tergite triangular, a little longer than wide, aciculate, pointed apically; ovipositer exserted in the paratypes; as long as the abdomen, not visible in the type; wings hyaline, the anterior ones without marginal cilia. Black; antennae, except the club, and legs, except the tarsi, dark brown; club piceous; tarsi stramineous.

Male.—Length 1 mm. Abdomen a little longer than the thorax, not quite as high, more strongly convex below than above, elliptical, twice as long as wide; second tergite two-thirds as long as wide; following segments subequal in length, and, with the exception of the terminal one, broadly transverse, united not quite one-half as long as the second; antennae pubescent, dark brown in color.

Type locality.—District of Columbia.

Paratype locality.—Virginia.

Type.—Cat. No. 2269, U.S.N.M. Type female and allotype male selected.

Redescribed from the type series, three females and one male. The type and allotype are from Washington; the two paratypes are from Virginia and bear the date "Oct. 10, 1880."

This species is one of the most remarkable in the genus. The peculiar structure of the mesonotum, and the great size and strange shape of the abdomen are not duplicated in any of the species known to me.

15. LEPTACIS FLAVICORNIS Ashmead.

Plate 1, fig. 11.

Leptacis flavicornis ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 275 (female only).

Amblyaspis flavicornis (Ashmead) BRUES, Connecticut Geol. Nat. Hist. Surv. Bull. No. 22, 1916 (1917), p. 533.

Female.—Length 0.90 mm. Of the type of structure represented by *longiventris* Ashmead; head scarcely wider than the thorax, twice as wide as long, not emarginate behind; frons shining, faintly shagreened; vertex and occiput shagreened, the former bounded posteriorly by a high, sharp carina; "the antennae in the female end in a 4-jointed club, the joints of which, except the last, are not longer than wide; the funicle is slender, the second joint a little longer than the first, the third and fourth being small"; thorax convex, three-fourths as wide as long, higher than wide, scarcely longer than high; finely shagreened except on pleural plates and on mesonotal knob; notauli absent; mesonotum as in *longiventris* but more elevated behind, the knob less in evidence, its upper surface polished; scutellum as in *longiventris*, the tubercle scarcely visible, located far down on the scutellum; abdomen as long as the thorax, elliptical, one and one-third times as long as wide; second tergite about as long as wide; following segments short, united about half as long as the second, wings tinged with brown, with short cilia. Black; antennae, except the club, bright yellow; legs, except middle and posterior femora and tibiae, and last joint of each tarsus, yellow; parts just made exception of are dark brown in color.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 25460, U.S.N.M.

Redescribed from the type specimen. The male from Florida represents a new species of *Leptacis*. It is in too poor a condition to be described.

16. LEPTACIS CYNIPSIPHILA Ashmead.

Leptacis cynipsiphila ASHMEAD, Can. Ent., vol. 19, 1887, p. 129 (female only).—CRESSON, Syn. N. Amer. Hym., 1887, p. 249.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 274.,

Female.—Length 1.50 mm. Closely related to *flavicornis*, *longiventris* and *globata*, with which species it forms a distinct division characterized by the gibbous mesonotum; head wider than the thorax, distinctly (but not greatly) more than twice as wide as long, seen from above its front and hind margins approximately straight; frons with a beautiful fine shagreening, with a small shallow impression medially; vertex and occiput finely shagreened, the former bounded posteriorly by a low but sharp carina; "funicle slender, the second joint longer then the first, the third and fourth small, but a little thicker than the second; club 4-jointed, the joints, except the last, as wide as long; "relative proportions of the thorax as follows: length 28, width 21, height 24; mesonotum and pronotum shagreened; mesonotum highly elevated posteriorly, densely pubescent on either side of the median lobe which is abruptly curved downward; scutellum as in *flavicornis* but the tubercle more in evidence, directed upward; abdomen elliptical, slightly narrower and longer than the thorax, not quite two-thirds as wide as long, without sculpture of any sort; second tergite a trifle longer than wide; following segments broadly transverse, the terminal one triangular, nearly as long as the three preceding united, polished; wings hyaline, somewhat whitish, the anterior ones without marginal cilia. Black; antenna, except club, brownish yellow; club brown-black; mandibles and legs, except coxae and middle and posterior femora, reddish yellow; coxae and femora, except the anterior ones, dark brown.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 2861, U.S.N.M.

Redescribed from the type specimen. The male specimen mentioned by Ashmead belongs to a new species. I do not describe it because I believe that species based on single specimens as types are undesirable in this difficult group.

17. LEPTACIS GLOBATA, new species.

Plate 2, figs. 12, 13.

Female.—Length 1.1 mm. Very closely related to *cynipsiphila*. It differs from my description of that species as follows: frons without a median impression; ridge between vertex and occiput very high and sharp; antennae as shown in figure; thoracic ratio: length 23, width 16, height 19; protuberance of mesonotum perfectly circular, evenly convex, polished, not abruptly turned downward posteriorly; area to either side of the protuberance not conspicuously pubescent; scutellum transverse, densely pubescent; spine as in *flavicornis;* abdomen 0.57 mm. long, elliptical, four-sevenths times as wide as long, sharply pointed apically; second tergite as wide as long, polished, without sculpture; following tergites also without sculpture, the three following the second subequal in length, becoming abruptly narrower posteriorly; sixth tergite slightly longer than the three preceding, triangular, much broader at the base than long; middle and hind femora, and hind tibiae, stramineous; coxae black.

Male.—Length 1.10 mm. Similar in most respects to the female. Antennae 0.77 mm. long; abdomen rather broadly elliptical, as long as but narrower than, the thorax, two-thirds as wide as long, 0.422 mm. long.

Type locality.—Washington, District of Columbia.

Type.—Cat. No. 25461, U.S.N.M. Type, allotype, and four paratypes.

Described from 25 females and 7 males collected by the author, April 28 and 29, 1921, on the leaves of *Tilia americana* Linnaeus.

Nine specimens are mounted on card points, the rest are in alcohol and are retained in my collection.

18. LEPTACIS AURIPES (Ashmead).

Polymecus auripes ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 283.—BRUES, Connecticut State Geol. Nat. Hist. Surv., Bull. No. 22, 1916 (1917), p. 535.

Female.—Length 1 mm. Head wider than the thorax, less than twice as wide as long, entirely distinctly shagreened, more strongly so above, in the region of the vertex and occiput; vertex rounded behind; notauli briefly indicated anteriorly; mesonotum with a short median projection posteriorly; scutellum pubescent, foveated at base, with a short straight spine above; abdomen a little longer than the head and thorax united, gradually contracted into a tail from the apex of the second segment; third segment one-half the length of the fourth; fifth twice as long as wide, and as long or a little longer than third and fourth segments united. Mahogany-colored; antennae and legs bright golden yellow; head black.

Type locality.—Virginia.

Type.—Cat. No. 25462, U.S.N.M.

Redescribed from the type specimen. The antennae (except one scape) and several of the legs, are lost.

19. LEPTACIS INCERTA (Ashmead).

Plate 1, fig. 14.

Anopedias incertus ASHMEAD, Can. Ent., vol. 19, 1887, p. 130.—CRESSON, Syn. Hym., 1888, p. 249.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 292.

Female.—Length 1.3 mm. Head wider than the thorax, a little over twice as wide as long; frons subopaque, finely and beautifully shagreened, with a few punctures at upper angles; vertex, occiput, and cheeks also finely shagreened; vertex separated medially from the occiput by a low carina; antennae finely pubescent, about as long as the head and the thorax united; the relative lengths and widths of joints are shown adequately in the accompanying illustration: thorax a trifle higher than wide, slightly more than two-thirds as wide as long, finely shagreened above and on the sides of the pronotum; notauli absent; mesonotum with a very short median projection behind, not reaching across the fovea; scutellum broad and depressed, the tubercle scarcely visible; abdomen about as long as the head and thorax united, convex above and below, four-sevenths times as wide as long, widest near the apex of the second tergite, from which part it diminishes rapidly to a point; second tergite a fifth longer than wide, not sculptured at all; tergites three to six also polished, the last nearly as long as the three preceding, much wider than long; wings hyaline, without a marginal fringe, extending but little beyond the apex of the abdomen. Shining black; antennae and legs mostly rufous; antennal club, coxae, and middle and hind femora, dark brown or piceous.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25463, U.S.N.M.

In writing the foregoing description I have examined the two female types in the National Museum. I found no males in the collection, a matter which is of small importance since this sex was not mentioned in the original description.

The absence of any appreciable spine might keep the species out of *Leptacis*, as limited by the older classification, but the general shape of the scutellum and the absence of foveae on the second tergite are typical of the genus as I understand it.

20. LEPTACIS INERMIS (Ashmead).

Plate 1, fig. 15.

Synopeas inermis ASHMEAD, Bull. No. 1, Col. Biol. Assoc., 1890, p. 10, female.—ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 287.

Female.—Length 1.5 mm. Body unusually long and slender for a species of this genus; head wider than the thorax, less than twice as wide as long, entirely finely shagreened; vertex not separated by a carina from the occiput, the latter faintly rugulose; antennae long and slender, as long as the abdomen, finely pubescent; thorax as wide as high, a little over three-fifths as wide as long, somewhat flattened above; notauli delicately indicated on posterior half of mesonotum, widely separated before the scutellum, the space between them forming a broad short lobe projecting partly over the scutellar fovea; scutellum rather broad, polished, sparsely pubescent on the sides, with an inconspicuous tubercle apically; abdomen long, elliptical when seen from above, convex above and below, one-fifth of its entire length longer than the head and thorax united; abdomen polished, pubescent only on the first and sixth segments; second tergite three-fourths as wide as long; following segments about equal, the sixth conical, a little longer than wide; wings hyaline, reaching far beyond the apex of the abdomen, with long marginal cilia. Black; scape at base, and legs entirely, stramineous; antenna brown, the club piceous.

Type locality.—West Cliff, Colorado.

Type.—Cat. No. 25464, U.S.N.M.

Redescribed from the type. One of the antennae has been mounted in balsam on a slide.

This species is remarkable in that it combines a broad, depressed scutellum with wings longly ciliate marginally. I had tried several years ago to retain Foerster's genus *Synopeas* by attempting to prove that in this group nonciliate wings always accompany a broad and depressed scutellum. *Leptacis inermis* served to frustrate my hopes in the matter.

21. LEPTACIS RUFISCAPA (Ashmead).

Plate 1, figs. 18, 19.

Synopeas rufiscapus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 288. Female and male.

Female.—Length 1.30 mm. Head twice as wide as long, not excavated posteriorly, subopaque by reason of its being uniformly finely shagreened; head seen from in front circular; vertex separated from the occiput by a carina; thorax as wide as high, one-third longer than wide; mesonotum convex, truncate posteriorly, the notauli absent; scutellum without pubescence above, with the tubercle absent; abdomen two-thirds as wide as long, broadly elliptical, abruptly narrowed posteriorly; second tergite not longer than wide; abdomen a little longer than the thorax, of about the same width; wings hyaline, with a short but distinct marginal fringe of hairs. Black; first six joints of antennae, mandibles, all of legs (except the coxae), and the hind femora and tibiae, rufous; rest of antennae and legs black or brownish-black.

Male.—Length 1.50 mm. Abdomen as long as the thorax, more or less ovate but not much narrowed anteriorly; second tergite with a narrow shagreened line posteriorly; anterior wing with the cilia either plastered down with shellac or not present.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 2275, U.S.N.M. Type female and allotype male selected.

Description based on female and male types in the National Museum. An antenna of each specimen is mounted in balsam on a slide. In the male the front and hind pair of legs are somewhat lighter colored than in the female.

22. LEPTACIS BRADLEYI, new.

The following description is based on the "male" types of *Dolichotypes hopkinsi*, Crawford and Bradley, originally described and figured in 1911.[25]

Female.—Length 1 mm. Frons subconvex, evenly rounded, very faintly reticulate; occiput more strongly reticulate, separated from the vertex by a blunt ridge; antennae as illustrated in connection with the original description; thoracic ratios: Length 20, width 12, height 14; spine of scutellum nearly straight in one specimen and strongly recurved in the other, about half as long as the rest of the scutellum; abdomen about twice as long as wide, as wide as the thorax, of a more slender shape than shown in the figure referred to above; second tergite as long as wide, widest apically, not medially as shown in the figure; tergites three to six polished, without visible sculpture; sixth tergite triangular, distinctly longer than wide, acutely pointed and with straight sides, not curved as shown in the original figure; hind wings with a long ciliary fringe. Shining black; scape yellow at base, rest of antenna dark brown; coxae, femora and tibiae, dark brown; trochanters golden yellow; tarsi stramineous.

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[25] Proc. Ent. Soc. Wash., vol. 13, 1911, pp. 124, 125.

Type locality.—Fall Creek, New York.

Type.—Cat. No. 25465, U.S.N.M. Type and paratype.

Described from the two types, deposited in the National Museum by Crawford and Bradley.

The original description of this species as the male of *Dolichotypes hopkinsi* is followed by a note saying that Professor Comstock found numerous specimens on a newly cut oak stump near Fall Creek. Nothing more is said regarding their habits.

23. LEPTACIS BREVIVENTRIS Ashmead.

Leptacis breviventris ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 273. Female in part only.

Amblyaspis breviventris (Ashmead) BRUES, Conn. State Geol. Nat. Hist. Surv., Bull. No. 22, 1916 (1917), p. 533.

Female.—Length 0.7 mm. Robust; head scarcely wider than the thorax, twice as wide as long; frons covered with fine undulating elevations reticulate in a way but with the lines rounded and subobsolete; occiput finely reticulate, separated from the vertex by a blunt ridge; antennae a little longer than the head and thorax united, inconspicuously pubescent; proportions of the thorax as follows: Length 18, width 13, height 15; mesonotum somewhat flattened, squarely excised posteriorly; notauli absent; scutellum convex, polished, not much wider than long, with the raised lateral margins far down on its sides; spine short, straight, blunt at apex; abdomen broadly elliptical, as long and as wide as the thorax, entirely smooth and shining; second tergite a little wider than long; terminal tergites broadly transverse, united one-third as long as the second; sixth tergite wider than long, triangular, with a rounded apex; wings hyaline, twice as long as the thorax, the anterior pair without distinct marginal cilia. Black; antenna (except the club) mandibles, front legs, and all tarsi, yellow or light brown; rest of legs dark brown to lighter shades of the same color, the femora the darkest.

Type locality.—Washington, District of Columbia.

Type—Cat. No. 25466, U.S.N.M.

Redescribed from the type specimen. The male type from Washington does not represent the same species as the female and is therefore not described here. Two females from Virginia and Maryland, belonging to the type series, also represent different species. They too remain undescribed.

The characteristics which distinguished this species are as follows: The finely reticulate frons; the slightly flattened and truncately excised mesonotum; the polished and regularly shaped abdomen; and the hyaline wings without cilia on the anterior pair.

24. LEPTACIS ACICULATA, new species.

Plate 1, figs. 16, 17.

Female.—Length 1.27 mm. Head about as wide as the thorax, full behind the eyes; frons transversely aciculate in a manner common to many species of *Platygaster;* vertex separated from the occiput by a high, sharp ridge; occiput shagreened; antennae rather long and slender, shortly pubescent, thoracic ratio: Length 25, width 17, height 20; mesonotum convex, shagreened, sparsely covered with short white hairs; notauli absent; mesonotum behind with a short U-shaped plate extending over the fovea to the scutellum; fovea traversed by short white hairs; scutellum highly convex, densely covered with short white hairs; spine of scutellum very short, acute, directed upwards; abdomen 0.62 mm. long, elliptical, two-thirds as wide as long, a little longer than the thorax, pointed apically; second tergite a little longer than wide, polished, without sculpture; next three tergites short, subequal in length, narrowing rapidly toward the apex, polished; last tergite triangular, not quite as long as the three preceding united, polished, considerably wider than long; wings slightly brownish, the anterior pair without cilia. Black; mandibles, base of scape, trochanters, most of anterior tibiae, and all tarsi (except the last joint of each) yellow; antennae brown and fuscous, the club darker; rest of legs brown and black, with varying shades of each, the bases of the tibiae, as is usual in this group, lighter.

Male.—Length 1 mm. Similar to the female in most respects. Antennae, especially the scape, rather long and slender; abdomen as long as the thorax but distinctly narrower, elliptical, broadly rounded posteriorly, two-thirds as wide as long; apex of second tergite with a narrow shagreened band (more distinct in some specimens than in others); tergites following the second narrow, each traversed apically by a narrow shagreened band. Black; appendages as a whole lighter colored than in the female; the antenna may be yellow with the terminal joints a little darker or the whole antenna may be yellowish brown or blackish, always darker distally; the legs likewise vary greatly in color but are rather dark in the majority of specimens; the antennae and front legs and also all tarsi always have a fair percentage of yellow.

Type locality.—Glen Echo, Maryland.

Type.—Cat. No. 25467, U.S.N.M. Type, allotype and three paratypes. All on one pin.

Described from 13 specimens, 10 males and three females, collected by the author in the spring of the year 1917. The dates vary from April 29 to June 19.

I believe this to be the most variable species I have described so far. It is fortunate that we have so many specimens as false conceptions would arise otherwise. Care should be taken not to be too strict in interpreting comparative lengths in which the abdomen as a whole figures. In proportion as the terminal segments are extended or retracted the abdomen will actually be longer or shorter. It is only the first and second segments that remain in constant proportion, not in constant length, and this is because they are not telescopic.

It may be well to mention here that the size of the insect is not constant. One of the female paratypes is only 0.88 mm. in length, and several of the male paratypes are as long as 1.22 mm.

25. LEPTACIS FLORIDANA Ashmead.

Plate 1, fig. 20.

Leptacis floridanus ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 272. Male and female.

Male.—Length 1.10 mm. Head twice as wide as long, distinctly wider than the thorax, entirely shagreened, more coarsely so than in *rufiscapa*; thoracic ratio: Length 27, width 15, height 19; notauli distinct, nearly reaching to the margin of the pronotum; mesontum shagreened, spine distinct but not very long, directed straight backward; abdomen obovate, as long and as wide as the thorax; second tergite as long as wide, without sculpture of any sort; segmental ratios (petiole not included): Lengths, 15, 2, 2.2, 2.2, 3; widths, 15, 11, 9, 6, 4; tergites 3-6 shagreened; wings hyaline, without cilia. Black; base of scape and parts of legs reddish yellow; femora, tibiae for the most part, and last joint of each tarsus, brownish.

Type locality.—Jacksonville, Florida.

Type.—Cat. No. 25468, U.S.N.M. Type selected.

Description based on male type. An antenna is mounted in balsam on a slide.

Two males and one female included by Ashmead in the type series do not belong to this species. They remain undescribed. The male selected agrees best with the original description.

26. LEPTACIS PUBESCENS Ashmead.

Plate 1, fig. 21.

Leptacis pubescens ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 275. Male.

Male.—Length 1.50 mm. Head distinctly but only slightly more than twice as wide as long, wider than the thorax, shagreened; vertex separated from the occiput by a carina; thoracic ratio: Length 32, width 20, height 22; mesonotum pubescent; notauli absent; scutellum transverse, pubescent all over, more strongly so on the sides; spine very short, sharp, directed upwards; abdomen a little longer and narrower than the thorax, elliptical, twice as long as wide; second tergite with an indistinct narrow shagreened band along its posterior margin; following segments similarly sculptured; segmental ratios (not counting the petiole): Lengths, 22, 2, 2, 2, 2; widths, 19, 17, 16, 14, 10, 5; wings hyaline, with a very short marginal fringe. Black; scape below, pedicel, and anterior legs yellowish brown; rest of legs mostly dark brown and piceous.

Type locality.—District of Columbia.

Type.—Cat. No. 25469, U.S.N.M.

Description based on the type located in the National Museum. An antenna and the right hind leg are mounted in balsam on a slide.

SPECIES OF UNCERTAIN POSITION.

SYNOPEAS NIGRIPES (Ashmead).

Synopeas nigripes ASHMEAD, Bull. 45, U. S. Nat. Mus., 1893, p. 286.

This was originally described as follows:

> *Male.*—Length 1 mm. Black, shining, with a microscopic sculpture; the face highly polished, with a median impressed line; lateral ocelli twice their width from the margin of the eye. Antennae 10-jointed, black, the flagellum thickened toward the apex, covered with sparse white hairs; pedicel as long as the first and second funiclar joints together, the first funiclar joint small, rounded; club joints, except the last, longer than wide, the last ovate. Mesonotum with two delicate furrows; scutellum convex, with a subobsolete tubercle at tip; metapleura opaque, sparsely pubescent; metanotum subpubescent. Legs entirely black, the tarsi piceous tegular black. Wings clear hyaline. Abdomen ovote, petiolate, as long as the thorax, the petiole and the base of second segment striated, the third, fourth, fifth, and sixth, segments with a transverse row of punctures.
>
> *Habitat.*—Washington, District of Columbia.
>
> Type in Collection Ashmead. (Original description.)

I am not sure whether this species belongs in *Leptacis* or *Platygaster*. The spined scutellum would seem to indicate the former genus but the striated first and second tergites certainly exclude it from that group and point rather to *Platygaster*. Inasmuch as the type has been lost I can not place the species definitely in one genus or the other.

HOST CATALOGUE.

The following is a list of the various insect hosts referred to in this paper:

COLEOPTERA.

Balaninus nasicus Say.
Trichacis rufipes Ashmead. Doubtful record.

Fidia viticida Walsh.
Fidiobia flavipes Asmead.

DIPTERA.

Aspidiotus, species on *Bigelovia*.
Platygaster striaticeps Ashmead.

Asynapta, species on *willow*.
Platygaster asynaptae Ashmead.

Cecidomyia antennaria Wheeler.
Platygaster antennariae Ashmead.

Cecidomyia baccharicola Ashmead MS.
Platygaster baccharicola Ashmead.

Cecidomyia C. ananassa Riley.
Platygaster virginiensis Ashmead.

Cecidomyia farinosa Osten Sacken on Blackberry.
Platygaster rubi Ashmead.

Cecidomyia pini-inopsis Osten Sacken.
Platygaster diplosidis Ashmead.

Cecidomyia serrulata Osten Sacken.
Platygaster alnicola Ashmead.

Cecidomyia symmetrica Osten Sacken on Oak.
Platygaster tumida Ashmead.

Dactylopius confusus.
Platygaster texana Fouts.

Dasyneura leguminicola Lintner.
Platygaster leguminicolae Fouts.

Diplosis tritici Felt.
Platygaster error Fitch.

Cecidomyid gall on Actnomeris squarrosa Nuttall.
Platygaster actinomeridis Ashmead.

Cecidomyid gall on Alder.
Platygaster columbiana Fouts.

Cecidomyid gall on *Artimesia californica*.
Platygaster artimesiae Ashmead.

Cecidomyid gall on Aster.
Platygaster astericola Ashmead.
Platygaster relativa Fouts.

Cecidomyid gall on *Atriplex canescens*.
Platygaster atriplicis Ashmead.

Cecidomyid gall on *Baccharis pilularis*.
Platygaster californica Ashmead.

Cecidomyid gall on Blackberry.
Trichacis rubicola Ashmead.

Cecidomyid gall on *Cornus paniculata* L'Herblay.
Trichacis cornicola Ashmead.

Cecidomyid gall on *Eurotia canata*.
Platygaster eurotiae Ashmead.

Cecidomyid gall on *Grapevine*.
Platygaster viticola Ashmead.

Cecidomyid galls on Hickory trees.

Eritrissomerus cecidomyiae Ashmead.
Platygaster caryae Ashmead.

Cecidomyid gall on *Lupinus atherea*.

Platygaster lupinicola Ashmead.

Cecidomyid galls on *Pinus ponderosa*.

Platygaster burkei Rohwer.

Cecidomyid gall on Sage brush.

Platygaster coloradensis Ashmead.

Cecidomyid galls on Solidago.

Platygaster solidaginis Ashmead.
Platygaster variabilis Fouts.

Cecidomyid gall on Willow.

Platygaster salicicola Ashmead.

Cecidomyid on *Picea engelmanni*.

Platygaster diplosidis Ashmead.

Cecidomyid on *Pinus edulis*.

Platygaster pini Fouts.

Lasioptera species on *Muhlenbergia*.

Platygaster linearis Fouts.

Oedaspis atra Loew.

Platygaster atrae Fouts.

Phytophaga destructor Say.

Platygaster herrickii Packard.
Platygaster hiemalis Forbes.
Platygaster vernalis Myers.

Rhopalomyia hirtipes Osten Sacken.

Platygaster semiglaber Girault.

Trypetid gall on *Vernonia noveboracensis*.

Platygaster vernoniae Ashmead.

Walshomyia texana Felt.

Platygaster feltii Fouts.

HEMIPTERA.

Aleurodes species.

Amitus aleurodinis Haldeman.

HYMENOPTERA.

Andricus blastophagus Ashmead.

Platygaster andriciphilus Ashmead.

Euura s.-nodus Walsh. From gall.

Platygaster euurae Ashmead.

Isosoma (?) galls on *Baccharis pilularis*.

Platygaster lampronota Fouts.

Neuroterus batatus Fitch.

Platygaster cynipicola Ashmead. Doubtful record.

LEPIDOPTERA.

Blastobasis glandulella Riley.

Trichacis rufipes Ashmead. Doubtful record.

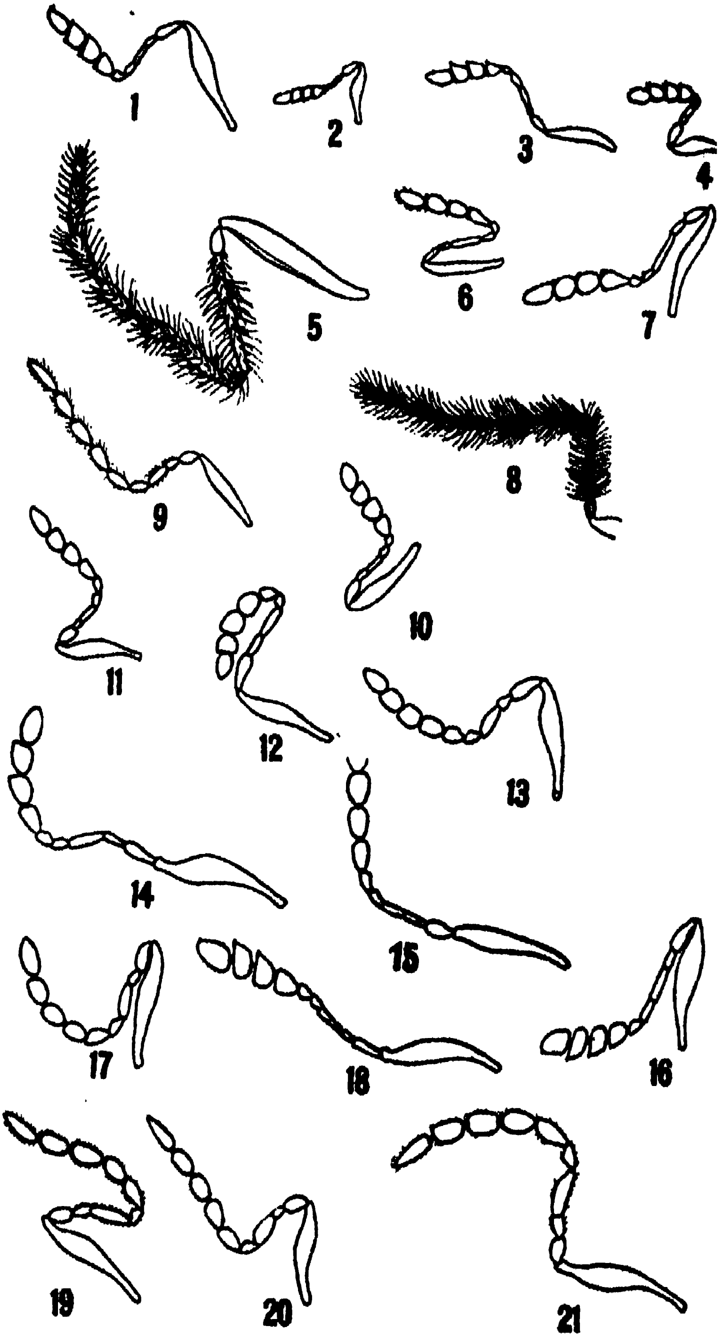
GENERAL COLLECTING AND REARING RECORDS.

Abies concolor (reared from cones).

Platygaster gahani Fouts.
Platygaster rohweri Fouts.

Abies shastensis (reared from cones).

Platygaster shastensis Fouts.



ANTENNAE OF VARIOUS SPECIES OF LEPTACIS.

FOR EXPLANATION OF PLATE SEE PAGE 138.

Black locust (collected on leaves).

Sactogaster anomaliventris Ashmead.

Catalpa (collected on leaves).

Leptacis pallipes Fouts.

Cercis canadensis Linnaeus (collected on leaves).

Leptacis gahani Fouts.

Grass (collected on leaves).

Platygaster websteri Fouts.

Hickory (collected on leaves).

Eritrissomerus parvus Fouts.

Liriodendron tulipifera Linnaeus (collected on leaves).

Platygaster marylandica Fouts.

Milkweed (collected on leaves and flower buds).

Leptacis pennsylvanica Fouts.

Mulberry (collected on leaves).

Sactrogaster mucronata Fouts.

Oak (collected on stump).

Leptacis hopkinsi Crawford and Bradley.
Leptacis bradleyi Fouts.

Picea engelmanni (reared from cones).

Platygaster lucida Fouts.

Pinus lambertiana (reared from cones).

Platygaster rohweri Fouts.

Populus (collected on leaves).

Sactogaster anomaliventris Ashmead.

Tilia americana Linnaeus (collected on leaves).

Leptacis globata Fouts.

Wild cherry (collected on leaves).

Sactogaster anomaliventris Ashmead.

Willow (reared from gall).

Isocybus canadensis Provancher.

EXPLANATION OF PLATE.

FIG. 1. Antenna of *Leptacis striatifrons* Ashmead. Female.
2. Antenna of *Leptacis maculipes*. Female.
3. Antenna of *Leptacis minuta*. Female.
4. Antenna of *Leptacis pennsylvanica* Fouts. Female.
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NEW PEARLY FRESH-WATER MUSSELS FROM MEXICO AND URUGUAY.

By William B. Marshall,
Assistant Curator, Division of Mollusks, United States National Museum.

Among a lot of material recently received for determination from Dr. Florentino Felippone, of Montevideo, Uruguay, and from Dr. A. L. Herrera, Director of Estudios Biologicos, City of Mexico, Mexico, were three new species which are herein described.

ELLIPTIO HERRERAE, new species.

Plate 1, figs. 6–8; plate 2, figs. 4, 5; plate 3.

Shell inflated, strong, moderately heavy; outline nearly elliptical, very slightly narrower in front, dorsal margin lightly arched, with a small elongate lunule in front of beaks, ventral margin rounded; nepionic shell with several indistinct concentric raised lines but without granules; later the young shell develops a number of slightly elongated granules arranged in quincunx order, and the upper part of the posterior dorsal area has a number of curving raised lines running from the posterior ridge to the margin; periostracum smooth, unctuous, slightly glossy, closely applied, and with no tendency to peel; color pale at the tips of the beaks, then deep green, changing farther down to light chestnut, nearly the whole shell plentifully rayed with darker green, even the very young shell showing these green rays. Nacre silvery white, very iridescent posteriorly, thicker in front; pallial line well marked, much crinkled; anterior adductor scars deep, clifflike at the upper part, the bottoms with roughened steplike thickenings; posterior adductor scars well marked, fairly deep at upper part; pseudocardinal teeth very rough and grooved and not distinctly divided into two parts in each valve; lateral tooth of left valve long, a little spatulate, slightly granular, obliquely grooved lengthwise; laterals of left valve two, the inner one larger and much like the lateral of the right valve, prismatic margin very narrow, not over a millimeter wide at the widest part, its color grayish-ashy.

Type.—Cat. No. 347188, U.S.N.M. It measures: Length, 71 mm.; height, 45 mm.; diameter, 32 mm. It comes from Estera del Avileno, in the State of Tamaulipas, Mexico. It and another specimen from the same place, Cat. No. 347184, U.S.N.M., were received from Dr. A. L. Herrera, director of Estudios Biologicos, City of Mexico. A third specimen from the same locality was returned to Doctor Herrera.

This species falls into the group of *Elliptio semigranosus* v. d. Busch. From that species it differs in being elliptical instead of subtriangular and in nacre and color of periostracum. It is, perhaps, more nearly related to *Elliptio distinctus* Crosse and Fischer, which, however, has reticulations near the beaks instead of the nodules of the present species. The nacre of *distinctus* is coppery, and its periostracum is olive-brown, while the nacre of *herrerae* is white and its periostracum is dark green and chestnut, with many rays.

DIPLODON (BULLOIDEUS ?) PERFRAGILIS, new species.

Plate 1, figs. 3, 4; plate 2, figs. 1–3.

Shell thin, delicate, translucent, inflated, oblique, narrow in front, broad behind, narrowly rounded in front, widely rounded behind, dorsal line nearly straight, but slightly bending downward in front of the beaks, very lightly winged both anteriorly and posteriorly, beaks located at about the front two-fifths of the dorsal line. Ventral margin rounded, posterior dorsal ridge very high, regularly rounded, the posterior dorsal area broad and rapidly descending to the margin. Concentric sculpture consisting of a number of rounded growth ridges, with three rest periods plainly indicated. Beaks each with 14 radiating bars spreading out like the ribs of a fan, no two of them joining into a V as seen in many of the *Diplodons*, the ninth bar the stoutest, the eighth and tenth the longest, these two reaching about two-fifths across the surface of the shell. Periostracum nearly smooth, slightly glossy, closely applied showing no tendency to peel, with several radiating wrinkles on the anterior and posterior areas. External coloring uniform light chestnut with a pinkish tint at the beaks. Interior showing the external sculpture, the radiating bars of the beaks showing as radiating sulci. Whole interior pinkish, becoming somewhat whitish near the ventral margin, nacre bright but with little iridescence. Pseudocardinal teeth of right valve, two, elongated, thin, joining in a point near the beak, the outer one the smaller, the summit of the inner one slightly overarching the narrow groove between the two. Pseudocardinal of left valve triangular, high, spatulate. The lateral of the right valve is very high at the far end; the laterals of the left valve long and high, the inner one the longer and higher.

Type.—Cat. No. 346801, U.S.N.M. It measures: Length, 28 mm.; height, 20 mm.; diameter, 15 mm. It comes from the Department of Colonia, Uruguay, and was collected and presented by Dr. Florentino Felippone, of Montevideo.

The delicate nature of the shell may be judged by considering its size in connection with the combined weight of the two valves, which is only 0.8346 gram, or approximately one thirty-fifth of an ounce. The species does not seem to bear any close relationship to any of the other species of the genus, its nearest relative being *Diplodon* (*Bulloideus*) *bulloides* Lea, of which the type is in the collection of the United States National Museum. *Perfragilis* is readily distinguished from *bulloideus* by its fragile nature, its more elongated form, the absence of a markedly angular posterior ridge, and the pinkish cast to the whole shell. The radiating bars on the umbones are very much stronger than is usual in *Diplodon* and lead one's thoughts to the genus *Castalina*. Further investigation with more material available, especially the soft parts which, unfortunately, are lacking in this specimen, may show that a new subgenus or section is needed for it. At present the section *Bulloideus* affords the best resting place for it.

DIPLODON PODAGROSUS, new species.

Plate 1, figs. 1, 2, 5; plate 2, figs. 6, 7.

Shell inflated, thick, subelliptic in outline, broadly rounded and subtruncate posteriorly, more narrowly rounded anteriorly. Hinge line lightly arched, joining the anterior margin in a curve with no perceptible angle, joining the posterior margin in a rounded angle. Sculpture of rather rude growth ridges with finer concentric lines between them and obscure indications of crude radial sculpture. Posterior ridge high, broadly rounded. Posterior dorsal area broad with a shallow indistinct groove running from the beak to the middle of the posterior margin. Beaks eroded, high, and full. Ventral margin gently curved, appearing to be slightly cut away anteriorly Periostracum thick, dull, of a nearly uniform dark chestnut brown. Interior white with a pale flesh tint and with but little iridescence except at the adductor and pallial scars. Of the two pseudocardinal teeth of the right valve the inner one is long and high and sharply serrated on its upper edge. The outer one is a low, thin, long, indistinct plate. The single lateral tooth of this valve is long and high and spatulate, its edge sharply crenulated, and its faces granulate and obliquely striate. The single pseudocardinal of the left valve is thin, high, serrate, and obliquely striate, its inner base standing on a little shelf. Of the two lateral teeth in this valve, the outer one is slightly the lower and the shorter, its edge sharply serrated. Edge of inner tooth lightly serrated. The two faces of these teeth facing each other are granularly, obliquely striated.

Type.—Cat. No. 346770, U.S.N.M. It measures: Length, 52 mm.; height, 33 mm.; diameter, 28 mm. It comes from Colon, in the Province of Entre Rios, Argentina, and was presented by Doctor Felippone. This locality is nearly opposite the city of Paysandu, Uruguay. This species classifies with *Diplodon firmus* Lea, to which it bears a close relationship. It is shorter, higher, and very much more inflated than *firmus*.

EXPLANATION OF PLATES.

PLATE 1.

All figures slightly reduced.

FIG. 1. *Diplodon podagrosus*, new species, right valve.
2. *Diplodon podagrosus*, new species, left valve.
3. *Diplodon* (*Bulloideus*?) *perfragilis*, new species, right valve.
4. *Diplodon* (*Bulloideus*?) *perfragilis*, new species, left valve.
5. *Diplodon podagrosus*, new species, dorsal view.
6. *Elliptio herrerae*, new species, right valve.
7. *Elliptio herrerae*, new species, left valve.
8. *Elliptio herrerae*, new species, dorsal view.

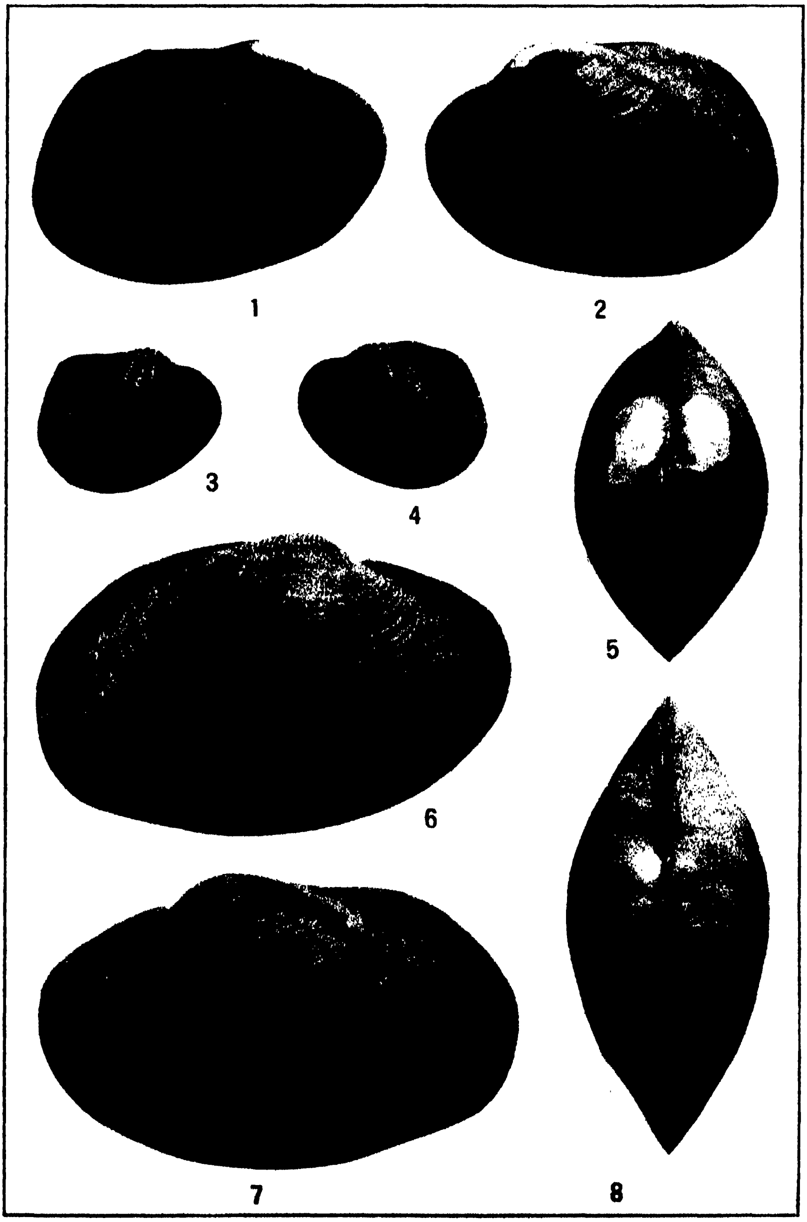
PLATE 2.

All figures slightly reduced.

FIG. 1. *Diplodon* (*Bulloideus*?) *perfragilis*, new species, left valve.
2. *Diplodon* (*Bulloideus*?) *perfragilis*, new species, dorsal view.
3. *Diplodon* (*Bulloideus*?) *perfragilis*, new species, right valve.
4. *Elliptio herrerae*, new species, right valve.
5. *Elliptio herrerae*, new species, left valve.
6. *Diplodon podagrosus*, new species, left valve.
7. *Diplodon podagrosus*, new species, right valve.

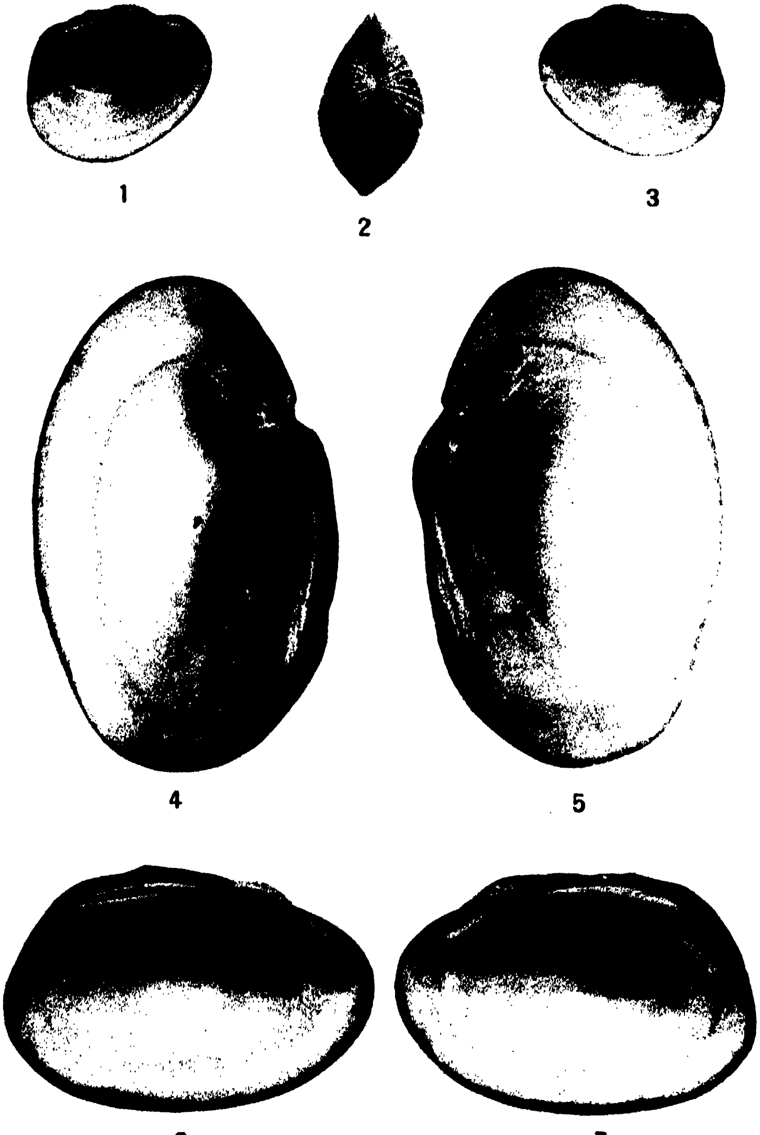
PLATE 3.

Elliptio herrerae, new species, right valve, enlarged.



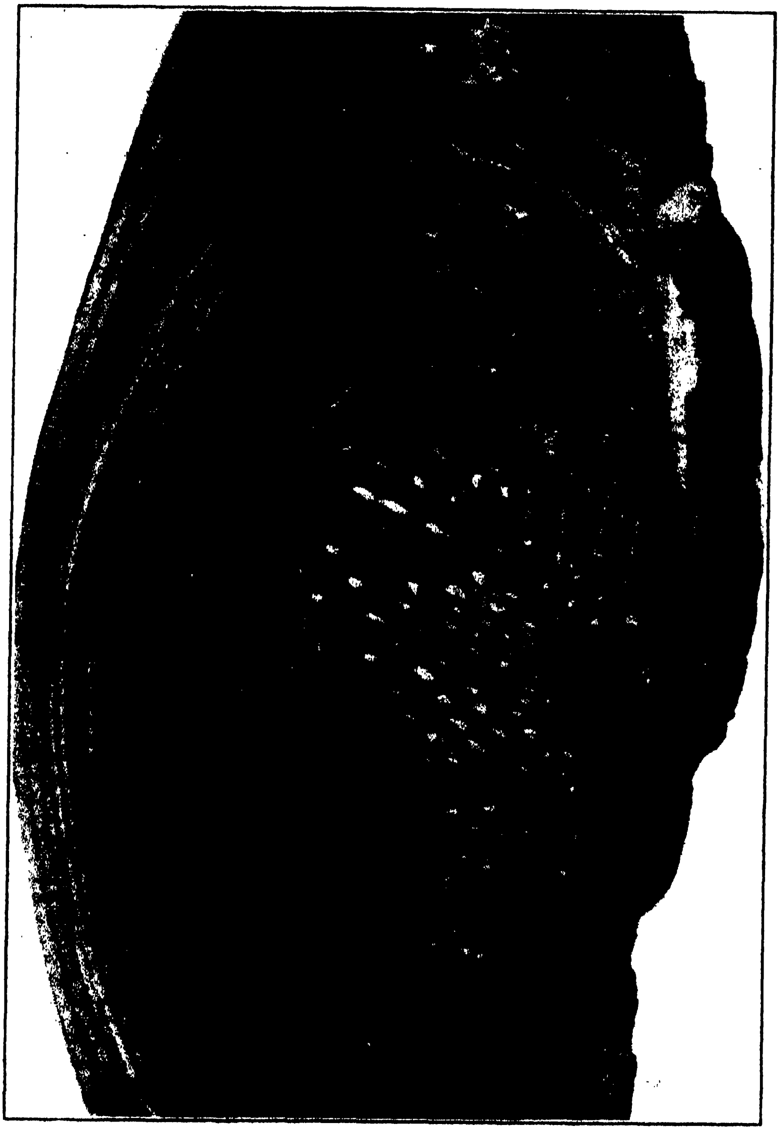
NEW FRESH-WATER MOLLUSKS FROM MEXICO AND URUGUAY.

FOR EXPLANATION OF PLATE SEE PAGE 4.



NEW FRESH-WATER MOLLUSKS FROM MEXICO AND URUGUAY.

FOR EXPLANATION OF PLATE SEE PAGE 4.



NEW FRESH-WATER MOLLUSK FROM URUGUAY.

FOR EXPLANATION OF PLATE SEE PAGE 4.

THE NORTH AMERICAN SPECIES OF PARASITIC TWO-WINGED FLIES BELONGING TO THE GENUS PHOROCERA AND ALLIED GENERA.

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and

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INTRODUCTION.

The present paper is an attempt to classify a difficult group of parasitic flies, species of which are very often reared in economic work and sent to the United States National Museum for identification. The only comprehensive work on the group hitherto published was by the late D. W. Coquillett[1]; he placed the species known to him, 39 in number, in the genera *Phorocera*, *Euphorocera*, and *Exorista*. The writers have excluded a few of his species, made synonyms of a few, rearranged the genera to conform as conservatively as possible with more recent ideas in nomenclature, and have described 41 new species, while recognizing 40 previously described North American species with a new description of each.

The group of genera under discussion offers as a whole the following characters:

Eyes hairy; ocellar bristles present and directed obliquely forward; rows of frontal bristles extending downward at least to the base of the third antennal joint; antennae elongate, reaching at least three-fourths of the distance from their origin to the edge of the mouth; sides of face bare, at least on lower half; face receding; vibrissae at or close to edge of mouth and not noticeably approximated to each other; palpi present and well developed; proboscis short and fleshy. Thorax with well-developed chaetotaxy; anterior acrostichals always distinct, one pair just in front of the suture ex-

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[1] Technical Bulletin No. 7, Division of Entomology, U. S. Department of Agriculture, 1897, pp. 91–105.

No. 2486—Proceedings U. S. National Museum, Vol. 63, Art. 17.

cept in some specimens of the subgenus *Phorocera;* pteropleural bristle small or absent. Abdomen black or gray, never metallic green, with macrochaetae but never with more than three pairs on middle of second tergite. Wings with normal venation, first posterior cell (apical) open, rarely closed in margin, ending considerably before apex of wing; last section of fifth vein never half as long as preceding; veins bare except base of third.

Absence of peculiar characters may be said to distinguish this group; if we add to it a similar series not very well separated in which the eyes are bare, the combination will comprise a vast central mass of the family Tachinidae in the wide sense, from which other genera or groups of genera seem to radiate in all directions by the development of peculiar characters. Naturally this central mass is the difficult part of the family, the outlying groups having their special characteristics which have greatly facilitated their classification.

We have included a number of tropical species, although our work must be very incomplete in that direction. We have not attempted the profitless task of discussing the probable identity of those species of earlier writers that we can not recognize, preferring to leave them to be elucidated from the types at some future time. Van der Wulp's Biologia types are in the British Museum, and those of Bigot are in the collection of J. E. Collin, of Newmarket, England; it is only a question of time until these are studied by a competent authority, and this will for the first time put the tropical North American fauna upon a sound basis.

Many new and unpublished rearing records have been added, and scattered ones have been gathered together; thus the economic aspect of the group has been appreciably clarified, although much remains to be done in the biological study of it. The criticism may be made that our classification does not sufficiently reflect the biological characters that have been made known in the last ten or fifteen years. We have given serious consideration to this anticipated objection. It is a difficult matter to assign taxonomic values to internal characters, and especially to physiological peculiarities. We should feel under greater obligations to attempt the task, if it were not for the fact that in 85 per cent of our species nothing whatever is known about these characters.

TABLE OF GENERA.

1. **Facial ridges with stout bristles at least up to middle................ 2**
   Facial ridges bristly at most only on lower third, rarely with weak bristles or hairs above this................ 6
2. **Penultimate joint of arista at least three times as long as thick................ 5**
   Penultimate joint of arista hardly longer than thick (*Phorocera* Robineau-Desvoidy)................ 3

3. (Subgenera of *Phorocera*) Inner forceps of male united into a broad, long organ, which is suddenly constricted into a short beak at tip; female with fifth sternite developed into stout plates, between which lies a very minute piercer........................Subgenus **Phorocera** Robineau-Desvoidy.
   Inner forceps of male united into a slender beak or hook; female without large sternal plates and piercer, distinguished by elongated abdominal segments or by an appendage or distinct fold at bend of fourth vein (*Euphorocera, Neophorocera, Euphorocerópsis*).
   Subgenus **Parasetigena** Brauer and Bergenstamm.
   Inner forceps of male separated as usual; female not with large sternal plates, elongated abdomen, or appendage at bend of fourth vein........ 4
4. Abdomen in both sexes very wide and deep, almost globose; unless contracted in drying the fourth segment closing in a slit above the genital opening.
   Subgenus **Patelloa** Townsend.
   Abdomen in both sexes of ordinary form........Subgenus **Neopales** Coquillett.
5. Front with an extra row of bristles, 3 to 6 in number, outside the usual row on each side..**Madremyia** Townsend.
   Front without additional bristles, face less receding than usual.
   Murdockiana Townsend.
6. Second antennal joint nearly as long as third............**Nemorilla** Rondani.
   Second antennal joint much shorter than third (**Zenillia** Robineau-Desvoidy).. 7
7. (Subgenera of *Zenillia*.) Abdomen in both sexes very wide and deep, almost globose; fourth segment unless contracted in drying closing in a slit above genital opening..............................Subgenus **Eusisyropa** Townsend.
   Abdomen of ordinary form.. 8
8. Discal macrochaetae usually absent, when present never arranged in pairs; abdominal hairs always erect, often approaching macrochaetae in size; cheeks narrow..............Subgenus **Parexorista** Brauer and Bergenstamm.
   Discal macrochaetae present or absent, but if present always arranged in pairs; abdominal hairs usually depressed.............................. 9
9. Penultimate joint of arista usually elongate, discal macrochaetae always present; black subshining species with black palpi.
   Subgenus **Phryxe** Robineau-Desvoidy.
   Penultimate joint of arista always short; discal macrochaetae present or absent..................................Subgenus **Zenillia** Robineau-Desvoidy.

LIST OF SPECIES.

Genus *Nemorilla* Rondani.
- *maculosa* Meigen (*pyste* Walker).
- *parva* Coquillett.
- *insolens*, new species.

Genus *Zenillia* Robineau-Desvoidy.
- Subgenus *Zenillia*.
  - *amplexa* Coquillett.
  - *protuberans*, new species.
  - *helvina* Coquillett.
  - *ochracea* Van der Wulp.
  - *marginata*, new species.
  - *angustivitta*, new species.

Genus *Zenillia* Robineau-Desvoidy—Continued.
- Subgenus *Zenillia*—Continued.
  - *coquilletti*, new species.
  - *lobeliae* Coquillett.
  - *valens*, new species.
  - *eudryae* Townsend.
  - *coerulea*, new species.
  - *formosa*, new species.
  - *inflatipalpis*, new species.
  - *polita* Coquillett.
  - *setinervis* Coquillett.

- Genus *Zenillia* Robineau-Desvoidy—Continued.
  - Subgenus *Phryxe* Robineau-Desvoidy.
    - *vulgaris* Fallén.
    - *caesar* Aldrich (*nigripalpis* Townsend, preoccupied).
    - *crassiseta*, new species.
    - *trisetosa* Coquillett.
    - *submissa*, new species.
  - Subgenus *Parexorista* Brauer and Bergenstamm.
    - *cheloniae* Rondani.
    - *reclinata*, new species.
    - *curriei* Coquillett.
    - *affinis* Fallén.
    - *confinis* Fallén.
    - *fronto* Coquillett.
  - Subgenus *Eusisyropa* Townsend.
    - *blanda*, Osten Sacken.
    - *blanda virilis*, new subspecies.
    - *blandita* Coquillett.
    - *ceratomiae* Coquillett.
    - *futilis* Osten Sacken.
- Genus *Phorocera* Robineau-Desvoidy—
  - Subgenus *Phorocera*.
    - *slossonae* Townsend.
  - Subgenus *Parasetigena* Brauer and Bergenstamm.
    - *alba* Townsend.
    - *virilis*, new species.
    - *cocciphila*, new species.
    - *divisa*, new species.
    - *tachinomoides* Townsend.
    - *complicata*, new species.
    - *claripennis* Macquart.
    - *cinaris* Smith.
    - *floridensis* Townsend.
    - *tessellata* Brauer and Bergenstamm.
    - *hamata*, new species.
    - *imitator*, new species.
- Genus *Phorocera* Robineau-Desvoidy—Continued.
  - Subgenus *Parasetigena* Brauer and Bergenstamm—Continued.
    - *indivisa*, new species.
    - *coccyx*, new species.
    - *subnitens*, new species.
    - *sulcata*, new species.
  - Subgenus *Patelloa* Townsend.
    - *leucaniae* Coquillett.
    - *fulviceps* Van der Wulp.
    - *facialis* Coquillett.
    - *meracanthae* Greene.
    - *specularis*, new species.
    - *pachypyga*, new species.
    - *setifrons*, new species.
    - *silvatica*, new species.
    - *pluriseriata*, new species.
    - *fuscimacula*, new species.
    - *reinhardi*, new species.
  - Subgenus *Neopales* Coquillett.
    - *noctuiformis* Smith.
    - *tortricis* Coquillett.
    - *erecta* Coquillett.
    - *comstocki* Williston.
    - *texana*, new species.
    - *flavicauda* Van der Wulp.
    - *parvitcres*, new species.
    - *sternalis*, new species.
    - *incrassata* Smith.
    - *xanthura*, new species.
    - *tenuiseta*, new species.
    - *unipilum*, new species.
    - *marginalis*, new species.
    - *halisidotae*, new species.
    - *festinans*, new species.
    - *levis*, new species.
    - *signata*, new species.
- Genus *Madremyia* Townsend.
    - *saundersii* Williston.
- Genus *Murdockiana* Townsend.
    - *gelida* Coquillett.

SYSTEMATIC DESCRIPTIONS.

Genus NEMORILLA Rondani.

Nemorilla Rondani, Dipt. Ital. Prod., vol. 1, 1856, p. 66. Type designated, ***Tachina maculosa*** Meigen.—Brauer and Bergenstamm, Zweifl. Kais. Mus., pt. 5, 1891, p. 328; pt. 6, 1893, p. 113.

Exorista part Coquillett, Revis. Tachin., 1897, p. 91.

TABLE OF SPECIES.

1. Mid tibiae with only one bristle on the outer front side near the middle 2

Mid tibiae with two or more bristles on the outer front side near the middle; bucca one-seventh the eye height .... **insolens**, new species.

2. Four dorsocentral and two sternopleural macrochaetae; abdomen with discal macrochaetae (*pyste* Walker) .... **maculosa** Meigen.

Three dorsocentral and three sternopleural macrochaetae; abdomen destitute of discal macrochaetae .... **parva** Coquillett.

NEMORILLA MACULOSA Meigen.

Tachina maculosa MEIGEN, Syst. Beschr. Zweifl. Ins., vol. 4, 1824, p. 265.

Nemorilla maculosa RONDANI, Dipt. Ital. Prod., vol. 3, 1859, p. 101.—BRAUER and BERGENSTAMM, Zweifl. Kais. Mus., pt. 4, 1889, pl. 1, fig. 12; pt. 5, 1891, p. 328.

Tachina pyste WALKER, List. Dipt. Ins., vol. 4, 1849, p. 754.

Tachina (*Exorista*) *phycitae* LEBARON, Sec. Rept. State Ent. Ill., 1872, p. 123.

Exorista scudderi WILLISTON, in Scudder's Butterflies of New England, vol. 3, 1889, p. 1921.

Exorista pyste COQUILLETT, Revision Tachin., 1897, p. 93.—GREENE, Proc. U. S. Nat. Mus., vol. 60, 1922, p. 11, fig. 34, puparium.—REINHARD, Ent. News, vol. 30, 1919, p. 281.

Front of male 0.205, 0.228, 0.238, and in the female 0.314, 0.309, 0.306 the head width; face and front silvery, the latter often tinged with golden; facial ridges bristly on the lowest third; bucca about one-sixth the eye height; antennae shorter than face, the third joint in both sexes not over one and a half times the second; arista thickened on the basal third, the penultimate joint short; palpi usually yellow, often brown or black in male. Thorax black, gray pollinose with three to five black vittae, when three are present the middle one is twice as wide as the others; four dorsocentral macrochaetae; scutellum black, sometimes the tip yellowish, bearing three long and one shorter apical pair of bristles. Sternopleura with two strong bristles. Abdomen black, gray pollinose, sometimes the sides of the intermediate segments yellowish and often the tip of the fourth segment in the female reddish yellow. Discal macrochaetae present on all segments but the first, abdominal hairs suberect in male, depressed in female. Legs long in the male, shorter in the female; mid tibiae with one long bristle on the front side near the middle; hind tibiae ciliate. Wings hyaline, third vein with two bristles at its base. Hypopygium blackish, inner forceps black, slender and slightly hooked at their apex, in profile the outer edge is straight, sparsely haired; outer forceps brown, thicker than the inner ones and terminating in a blunt point.

Length 5 to 8 mm.

Redescribed from a long series of both sexes, from New England and Idaho to Cuba, the Virgin Islands, and Arizona. Three males and two females from Europe, determined by Professor Bezzi, agree in genitalia and all other characters with the darker of the North American specimens. The species has a voluminous literature in Europe, and has been reared many times in the United States, always from larvae of moths and butterflies. It is also recorded from Canada.

The species lays macrotype eggs on the host.

NEMORILLA PARVA Coquillett.

Exorista parva Coquillett, Revis. Tachin., 1897, p. 100.

Third antennal joint of female scarcely twice the length of second; no discal macrochaetae; mid tibiae bearing one bristle on outside near middle; palpi yellow.

Female.—Front 0.292 the head width, the sides bearing only a few short hairs; face and front gray pollinose; bucca one-seventh the eye height; third joint of antennae hardly twice the length of the second; penultimate joint of the arista short; facial ridges bristly on the lowest fourth; palpi yellow. Thorax black, gray pollinose, marked with three black vittae, the middle one twice as wide as either of the others; three dorsocentral macrochaetae present; scutellum gray, bearing two long and an intermediate short pair of marginal bristles; sternopleura with three bristles. Abdomen destitute of discal macrochaetae, black, gray pollinose with numerous reflecting black spots. Mid tibiae bearing one bristle on the outside near the middle; hind tibiae outwardly subciliate.

Length 4 mm.

The single specimen is labeled " Colo. 1793 " and was received from C. F. Baker. No additional material has come to light in 25 years.

Type.—Female, Cat. No. 3600, U.S.N.M.

NEMORILLA INSOLENS, new species.

Second antennal joint nearly as long as the third; three sternopleural and three dorsocentral macrochaetae; two midtibial bristles.

Front of male very narrow, 0.138, 0.119, 0.105 and in the female 0.353, 0.300, 0.324 the head width; head bulging below, face and front gray pruinose; facial ridges bristly on the lowest fourth; bucca one-fifth the eye height; parafacial at narrowest part scarcely the width of the third antennal joint; antennae yellow, sometimes blackish at apex, about three-quarters the length of face, third joint in both sexes slightly longer than the second, arista thickened on the basal fourth, the penultimate joint short. Thorax black, gray pollinose, indistinctly vittate, with three dorsocentral macrochaetae. Scutellum black with three pairs of long marginal bristles. Sternopleura sparsely haired in female, densely so in male and bearing three bristles. Abdomen black, gray pollinose, no distinct pattern in female, in the male the apices of the intermediate segments are polished black. Discal macrochaetae arranged in pairs, abdominal hairs subdepressed in female, erect in male and nearly as long as the macrochetae. Mid tibiae with two bristles on the outer front side near the middle; hind tibiae subciliate at most. Third vein with two bristles at its base. Hypopygium apparently the same as in *maculosa.*

Length 5 to 8 m.

Type.—Male, Cat. No. 25693, U.S.N.M.

Described from six specimens of both sexes collected at Melrose Highlands, Massachusetts, May and June, 1918.

Genus ZENILLIA Robineau-Desvoidy.

Zenillia Robineau-Desvoidy, Myodaires, 1830, p. 152. Type, *Musca libatrix* Panzer, originally included, by designation of Robineau-Desvoidy, Dipt. Env. Paris, vol. 1, 1863, p. 471.

Phryxe Robineau-Desvoidy, Myodaires, 1830, p. 158. Type, *Tachina vulgaris* Fallén, by designation of Robineau-Desvoidy, Dipt. Env. Paris, vol. 1, 1863, p. 329; on page 358 of the same work he makes *Phryxe athaliae*, an included species, a synonym of *vulgaris*, which was not included.

Carcelia Robineau-Desvoidy, Myodaires, 1830, p. 176. Type, *bombylans*, new species, by designation of Robineau-Desvoidy, Dipt. Env. Paris, vol. 1, 1863, p. 220. Macquart, in Hist. Nat. Dipt., vol. 2, 1835, p. 108, had made *bombylans* a synonym of *Tachina gnava* Meigen, and this disposition of it has been generally followed since.

Aplomyia Robineau-Desvoidy, Myodaires, 1830, p. 184 (*Aplomya*). Type, *Tachina confinis* Fallén, by designation of Robineau-Desvoidy, Dipt. Env. Paris, vol. 1, 1863, p. 459. On page 460 he makes *zonata* (male) and *servillei* (female), both included species, synonyms of *confinis*, which was not included. Coquillett, Type-Species, 1910, p. 509, takes *zonata* as type, regarding it as a synonym of *confinis*.

Hubneria Robineau-Desvoidy, Annales Soc. Ent. France, 1847, p. 601. Type, *Tachina affinis* Fallén, by designation of Robineau-Desvoidy, Dipt. Env. Paris, vol. 1, 1863, p. 279. On the same page he makes his *nigripes*, new species, originally included, a synonym of *affinis*, not included.

Chaetolyga Rondani, Dipt. Ital. Prod., vol. 1, 1856, p. 66 (*Chetoliga*). Type, designated, *Tachina gnava* Meigen.

Blepharidea Rondani, Dipt. Ital. Prod., vol. 1, 1856, p. 67. Type designated, *Tachina vulgaris* Fallén.

Parexorista Brauer and Bergenstamm, Zweifl. Kais. Mus., pt. 4, 1889, p. 87. Type (sole species), *Exorista cheloniae* Rondani.

Myxexorista Brauer and Bergenstamm, Zweifl. Kais. Mus., pt. 5, 1891, p. 331. Type, *Musca libatrix* Panzer, by designation of the authors in Verh. Zool. Bot. Ges. Wien, vol. 43, 1893, p. 479.

Eusisyropa Townsend, Smiths. Misc. Colls., vol. 51, 1908, p. 97. Type designated, *Exorista blanda* Osten Sacken.

Oxexorista Townsend, Proc. Ent. Soc. Wash., vol. 14, 1912, p. 165. Type designated, *Exorista eudryae* Townsend (in Proc. Biol. Soc. Wash., vol. 28, 1915, p. 21, the type material is renamed *Oxexorista thompsoni*, new species, in the belief that it was wrongly identified in 1912).

Euexorista Townsend, Proc. Ent. Soc. Wash., vol. 14, 1912, p. 166. Type designated, *Exorista futilis* Osten Sacken.

Chrysomasicera TOWNSEND, Journ. N. Y. Ent. Soc., vol. 23, 1915, p. 230. Type designated, *borealis*, new species.

Chrysoexorista TOWNSEND, Proc. U. S. Nat. Mus., vol. 49, 1915, p. 435. Type designated, *viridis*, new species.

The type species of all the above genera have been examined, and protracted effort has been given to the task of finding satisfactory generic characters to separate them, but with little success. Realizing that several of them have been regarded by the later authorities of Europe as valid for that continent, we have earnestly endeavored to retain such, especially *Phryxe* and *Carcelia.* It seems to us, however, that the external characters show such complete gradation in North American species that we can not discover natural lines of division of more than subgeneric rank, as indicated in our table of genera. Generic characters should be those of more ancient origin, externally recognizable, and should exist in both sexes, although they be supplemented by others which do not meet these requirements. Whether a species lays large or small eggs we can not consider of generic importance, as the complex reproductive modifications which are so striking in the great Tachinid group seem to us of very recent development here, and not correlated with any distinct characters in other parts.

We are dealing here with the immense central mass of the family, in which large genera may naturally be expected. There is a wealth of specific characters. A policy of splitting which would logically terminate in a genus for every species is in the end ruinous to the taxonomic scheme, as it eliminates the genus as a category and necessitates the recognition of some substitute, as the supergenus or the tribe. This might not be a serious matter if the genus were not by convention a part of the scientific name, for which we can not substitute anything else.

The species known to Coquillett at the time of his Revision in 1897 were placed by him in *Exorista.* This genus had but one species when erected, *Musca larvarum* Linnaeus, which thus must be the type of the genus, and which Coquillett placed in his *Tachina.* The type of *Tachina* is *Musca grossa* Linnaeus, a widely different species, which is also the type of the later genus *Echinomyia. Tachina* therefore should replace *Echinomyia*, *Exorista* should replace *Tachina* in Coquillett's sense, and another name be selected for what Coquillett called *Exorista.* For this last vacancy we select *Zenillia* Robineau-Desvoidy, which has not only as early a date as any in our list of synonyms, but has page precedence over *Phryxe*, *Carcelia*, and *Aplomyia*, of the same date. Coquillett himself proposed these changes for *Tachina* and *Exorista* in his Type-Species paper of 1910.

Our grouping is considerably modified from that of Coquillett, Revision, 1897, since, as will appear from the appended list, we have excluded a considerable portion of his material; it differs also from that of his Type Species paper of 1910, in which he divided the group in the European manner, following Professor Bezzi's Palaearctic Catalogue. Doctor Townsend has never published a synopsis of the group now under consideration, but it is apparent from his papers that he would recognize a large number of genera.

The latest European treatment is by Baer,[2] whose table can be reduced for the present group to the following:

1. Hind tibiae ciliated on outer side, at least in male, with regular comblike curved bristles, among which one or two sometimes stand out larger ---------- Carcelia.
Hind tibiae with unequal bristles, bare or less regularly bristled ---------- 2
2. Apical scutellars erect and decussate; claws in both sexes short ---------- Phryxe.
Apical scutellars generally curved backward, decussate or convergent; sometimes feebly developed; rarely erect, and then the male has long claws ---------- 3
3. Facial ridges with somewhat regularly arranged bristles above the vibrissae to the middle of the eye height; claws of male elongate ---------- Zenillia.
Facial ridges with only a few rapidly decreasing bristles above the vibrissae; bucca not over one-fourth the eyeheight ---------- Exorista.

The first character of this table is perhaps the most difficult of all to apply to the North American material. It is better developed in males than females, and there are numerous intermediate species. We are unable to see more than a specific character in the apical scutellars, and the length of the claws in the male seems of even less importance, as it is confined to one sex.

We are unable to make an abridgement of Brauer and Bergenstamm's tables[3] which will show their disposition of this group. Whatever merit these authors possess is not to be found in their construction of analytical tables. It would seem that in the course of their work they modified their tables a little at a time, until in their final form they are very complicated and confusing.

The type species of *Zenillia*, *libatrix* Panzer, does not occur in North America. It has yellow pollen dorsally on head, thorax, and abdomen, about as in our *helvina* Coquillett, with which it also agrees in having three sternopleurals, four dorsocentrals, two bristles on the front side of the middle tibia, etc.; but differs in having large discals on the second and third segments (*helvina* has small on the third only), and especially in having the facial ridges bristly almost to the middle, so as to come rather close to *Phorocera* in this character. The bristles, however, are weak, hardly more than hairs, and do not extend quite so high as in *Phorocera*.

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[2] Die Tachinen als Schmarotzer der schädlichen Insekten, Beiheft Ztschr. f. angewandte Ent., p. 75, 1921.

[3] Zweiflügler des kaiserlichen Museums zu Wien, parts 4 and 6, 1889 and 1893.

Townsend observed in 1911[4] that there are a great variety of reproductive habits "in specimens which possess the external characters ordinarily considered as defining the genus *Exorista*." Inasmuch as the reproductive habits are known in only about 15 per cent of our species, it is naturally impossible to make much of an attempt to correlate them with adult characters, and we think it impracticable—for the present at least—to establish any sort of taxonomic groups upon them. At the same time we find these characters in the family of extreme scientific interest and often of great biologic and economic importance; and we welcome all additions to a knowledge of them. The following notes are from Pantel, Neilsen, Townsend, and Baer.

Libatrix and *futilis* deposit microtype eggs on foliage, which are intended to be eaten by the host.

Affinis deposits eggs that are ready to hatch, upon the host.

Vulgaris deposits newly hatched larvae upon the host.

Cheloniae deposits thin-shelled, stalked eggs upon hairy caterpillars.

LIST OF SPECIES INCLUDED IN EXORISTA BY COQUILLETT BUT NOT HERE INCLUDED IN ZENILLIA.

aerata Coquillett, Revision, 1897, p. 100, is a synonym of *Doryphorophaga doryphorae*, from the type.

dorsalis Coquillett, Canad. Ent., vol. 30, 1898, p. 236, is also a *Doryphorophaga; Parkeriellus flavipalpis* H. E. Smith, Proc. Ent. Soc. Wash., vol. 18, 1916, p. 96, is either the female of this or of a very closely related species.[5]

dubia Fallén, of Europe and North America belongs to the genus *Lypha* Robineau-Desvoidy, 1830, and is considered to be synonymous with *silvatica*, the type. *Aporomyia* Rondani, 1859, has the same type. The genus is perfectly valid, distinguished by having a very large pteropleural bristle, which seems to have escaped notice in publications.

isae Coquillett, Revision, 1897, p. 96, belongs to *Pseudeuantha*, and is a synonym of *johnsoni* Townsend (Aldrich, Insecutor Ins. Menst., vol. 9, 1921, p. 88).

ordinaria Van der Wulp, as identified by Coquillett. The National Museum now contains under Coquillett's label only three males from Allende, Mexico; they have no ocellars and should be referred to another genus. Coquillett identified for the senior writer many years ago a female which has since proved to be *Doryphorophaga dorsalis*. The true *ordinaria* of Van der Wulp can hardly be identified without an examination of the type.

parva Coquillett, Revision, 1897, p. 100, is a *Nemorilla*.

petiolata Coquillett, Revision, 1897, p. 98, is a dwarfed male of *Phorocera claripennis* Macquart.

spinipennis Coquillett, Revision, 1897, p. 95, is a synonym of *Exoristoides slossonae* Coquillett, Revision, 1897, p. 91. The large pteropleural bristle, strangely overlooked by describers, is the important character in this genus.

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[4] Proc. Ent. Soc. Wash., vol. 13, p. 165.

[5] The females of *Doryphorophaga* as far as known all have a striking character which makes them very easy to distinguish: on the middle coxae is a dense tuft of recurved, stubby bristles forming almost a solid mass bending back over the coxae. These spines have remained unnoticed by describers; they probably serve to hold the host during larviposition, as ventral abdominal spines do in many other species.

TABLE OF SPECIES OF ZENILLIA.

1.	Abdomen bearing true discal macrochaetae	15
	Abdomen destitute of true discal macrochaetae	2
2.	Palpi yellow	5
	Palpi black	3
3.	Thorax bearing three dorsocentral and three sternopleural macrochaetae; mid tibiae with one bristle on the outside near the middle (if with two or more see No. 8)	**coquilletti**, new species.
	Thorax bearing four dorsocentral macrochaetae	4
4.	With four sternopleural bristles; anal segment of the abdomen shining black	**confinis** Fallén.
	With three sternopleural bristles; anal segment of the abdomen gray or yellowish pollinose	**futilis** Osten Sacken.
5.	Mid tibiae with two or more stout bristles on the outer front side near the middle	11
	Mid tibiae with but one stout bristle on the outer front side near the middle	6
6.	Third vein with but a few bristles at its base	7
	Third vein bristly to the small cross vein; abdomen black, shiny, the base of intermediate segments gray pollinose	**setinervis** Coquillett.
7.	Abdomen black and shiny; basal fourth of segments two and three thinly gray pollinose at most	**polita** Coquillett.
	Abdomen black or brown, gray pollinose	8
8.	Bucca one-eighth or more eyeheight	10
	Bucca not over one-twelfth eyeheight; the two uppermost frontal bristles reclinate (if with three reclinate frontal bristles see No. 22)	9
9.	Marginal macrochaetae of the abdomen not distinctly separated from the erect hairs of the dorsum; third antennal joint of the male two and one-half times the second; first to fourth abdominal segments with yellow ground color on sides, which is not covered by the thin pollen	**protuberans**, new species.
	Marginal macrochaetae of the abdomen distinct from the erect hairs of the dorsum; third antennal joint of the male at least three times the second; if the sides of the abdomen are yellow it is largely concealed by the dense pollen	**amplexa** Coquillett.
10.	The anterior stout reclinate bristle of the front is only one-third from the inner vertical to the antennal insertion. Male without orbitals.	**ceratomiae** Coquillett.
	Palpi in male densely clothed with long black hairs; male with orbitals, both sexes with a stout reclinate bristle halfway between antennal insertion and inner vertical; front and face light golden pollinose; thorax and abdomen thinly gray pollinose (*Eumasicera coccidella* Townsend)	**Sturmia sternalis** Coquillett.[a]
11.	With three sternopleural bristles	12
	With four sternopleural bristles; facial ridges bristly about one-half way	**lobeliae** Coquillett.
12.	Second antennal joint less than one-half as long as the third	13
	Second antennal joint about one-half as long as the third; abdominal hairs erect on the intermediate segments	**coerulea**, new species.

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[a] The male was described as the female by Coquillett (Revis., 1897, p. 109); Townsend described the female (Annals Ent. Soc. Amer., vol. 2, 1909, p. 249); the synonymy was indicated by Thompson (Psyche, vol. 17, 1910, p. 211). Some of the specimens have the eyes somewhat hairy, so we insert it in the table to avoid mistakes.

13. Bucca one-sixth the eye height.................... 14

Bucca one-twelfth the eye height; third antennal joint of the female at least three times the length of the second; the two uppermost frontal bristles strong and reclinate; thorax and abdomen black, gray pollinose.................... **formosa**, new species.

14. Male with dense patches of fine hair on the hind tergite of the abdomen near the middle below; female with depressed hairs on the third tergite above.................... **eudryae** Townsend.

Male without such patches of hair, female with erect hairs on the middle of the third abdominal segment (if with linear bucca and swollen palpi, see *inflatipalpis*).................... **valens**, new species.

15. Palpi yellow.................... 21

Palpi black.................... 16

16. Mid tibiae with two or more bristles on the outer front side near the middle.................... 17

Mid tibiae with one bristle on the outer front side near the middle (*nigripalpis* Townsend preoccupied).................... **caesar** Aldrich.

17. Costal spine short, scarcely distinguishable from the adjacent bristles.... 18

Costal spine long; abdomen black, subshining; bucca one-third the eye-height; three dorsocentral macrochaetae.................... **trisetosa** Coquillett.

18. With three sternopleural bristles; usually four dorsocentral macrochaetae present.................... 19

With four sternopleural bristles; eyes thinly hairy; front of male very narrow, 0.147 the head width.................... **submissa**, new species.

19. Scutellum yellowish.................... 20

Scutellum black; front at vertex in both sexes less than eye width (*nigripalpis* Townsend preoccupied).................... **caesar** Aldrich.

20. Front at vertex about two-fifths the head width; silvery pollinose, somewhat blackish at vertex; penultimate joint of the arista usually twice as long as broad.................... **vulgaris** Fallén.

Front at vertex much narrower; golden pollinose, the penultimate joint of the arista short.................... **crassiseta**, new species.

21. Mid tibiae with two or more bristles on the outer front side near the middle.................... 29

Mid tibiae with but one bristle on the outer front side near the middle.................... 22

22. Head, thorax, and abdomen yellow pollinose.................... 26

Head, thorax, and abodmen black, gray pollinose.................... 24

23. Omitted.

24. Abdominal hairs depressed; bucca one-eighth or less the eye height.... 25

Abdominal hairs erect; bucca one-fifth the eye height.......... **fronto** Coquillett.

25. With two sternopleural bristles (rarely a weak third sternopleural bristle present).................... **blanda** Osten Sacken.

With three stout sternopleural bristles; apical scutellar bristles directed backward.................... **blandita** Coquillett.

26. With three dorsocentral macrochaetae and two or three sternopleural ones.................... 28

With four dorsocentral macrochaetae and three sternopleural ones; bucca one-fifth the eye height.................... 27

27. Front prominent; second and third abdominal segments satiny golden pollinose, the posterior fourth sharply divided, dull black and entirely free from pollen---- **ochracea** Van der Wulp.

Front not prominent; second and third abdominal segments golden pollinose with shiny black hind edges which blend partially with the golden---- **marginata**, new species.

28. With two sternopleural bristles; fourth segment of the abdomen destitute of macrochaetae; apices of the intermediate segments of the abdomen concolorous---- **angustivitta**, new species.

With three sternopleural macrochaetae; fourth segment of the abdomen with two rows of macrochaetae; apices of the intermediate segments of the abdomen black---- **marginata**, new species.

29. Head, thorax, and abdomen black, gray pollinose---- 30

Head, thorax, and abdomen yellowish pollinose; second segment of the abdomen often destitute of discal macrochaetae---- **helvina** Coquillett.

30. With four dorsocentral macrochaetae---- 32

With three dorsocentral macrochaetae and three sternopleurals---- 31

31. Males without orbital bristles; third joint of the antennae in the male two and one-fourth, in the female about twice the length of the second; mid tibiae with three or more bristles on the outer front side near the middle; discal macrochaetae not arranged in pairs---- **affinis** Fallén.

Males with orbitals; third joint of the antennae in both sexes about four times the second; mid tibiae usually with but two long bristles on the outer front side near the middle---- **curriei** Coquillett.

32. With two sternopleural bristles---- 34

With three sternopleural bristles---- 33

33. Palpi swollen; abdominal hairs depressed; second antennal joint not especially elongated---- **inflatipalpis**, new species.

Palpi normal; abdominal hairs erect; second antennal joint elongated.
coerulea, new species.

34. Abdomen covered with a thin bluish white pollen, narrow apical margins of the second and third segments shining black, their bases gray pollinose; body and legs blackish, the tibiae often brownish; face silvery; when viewed from behind the inner forceps are widely separated.
reclinata, new species.

Abdomen, including the hind margins, covered with yellowish gray pollen; body and legs brownish; face gray pruinose; when viewed from behind the inner forceps are closely approximated.
cheloniae Rondani.

Subgenus ZENILLIA.

ZENILLIA AMPLEXA Coquillett.

Exorista amplexa COQUILLETT, Revis. Tachin., 1897, p. 97.
Exorista griseomicans VAN DER WULP, Coquillett, Revis. Tachin., p. 98.
Exorista flavirostris VAN DER WULP, Coquillett, Revis. Tachin., p. 100.
Sisyropa hemerocampae TOWNSEND, Annals Ent. Soc. Amer., vol. 2, 1909, p. 248.

Front in both sexes variable, in the male from 0.192 to 0.210 and in the female 0.200 to 0.245 of the head width; front and face silvery pollinose, never with a strong yellowish cast; the sides of former bearing a few indistinct hairs; usually the front and face are of equal width but sometimes the face is slightly wider; in profile the front at base of antennae projects forward about one-fourth to one-third of the eye width. Facial ridges bristly on the lowest fifth; bucca one-twelfth the eye height; antennae black or yellow, nearly as long as face, the third joint in both sexes three to four and one-half times the second, arista thickened on the basal fifth and in some specimens on the basal third, the penultimate joint short. Thorax black, gray pollinose, with four black vittae; dorsocentral macrochaetae variable, usually with four, sometimes with three and occasionally with three on one side and four on the other; scutellum black at base, usually gray pollinose although quite often yellowish, bearing three or four pairs of long marginal bristles besides the apical pair which are directed backward and usually cruciate; sternopleural bristles variable, usually two long and a vestigial one, sometimes three and very often their development is so variable as to exclude their use as a specific character; pteropleural bristles about the size of the sternopleural ones. Abdomen variable, may be either black, gray pollinose, or entirely yellow, excepting a narrow black vitta on the dorsum, between these two extremes there are many other shades. No discal macrochaetae present, first and second segments bear one pair each of median marginal macrochaetae, third with a marginal row and the fourth wholly covered with bristles two-thirds as long as the macrochaetae of the third segment; abdominal hairs usually subdepressed, sometimes quite erect, but if so they are short and inconspicuous. Legs brown or black; usually the tibiae somewhat brownish; mid tibiae with one bristle on the outer front side near the middle; hind tibiae short-ciliate with one longer bristle near the middle, this longer bristle is variable in length although always longer than the surrounding ones. Third vein with two bristles at its base.

Length 8 to 10 mm.

Redescribed from many specimens from New England, Pennsylvania, District of Columbia, Mississippi, Florida, Texas, and Western United States and Canada.

Type.—Cat. No. 3596, U.S.N.M., from Mount Washington, New Hampshire.

The species, as may be seen from the description, is very variable. Many specimens of the various forms have been examined and we are unable to find any good character to separate them. Certain specimens from the Southern States are more yellowish and while the black forms seem typical of the Northern States they are not without exception. In the few specimens in which the genitalia have been studied, we have found them quite alike in structure.

ZENILLIA PROTUBERANS, new species.

Front in male 0.256–0.245 of the head width; face and front silvery pruinose, the sides of the latter bearing a few inconspicuous hairs; facial ridges hairy on the lowest third or less; bucca one-twelfth the eye height; palpi yellow; antennae shorter than face, the third joint two and one-half times the second; arista thickened on the basal third, the penultimate joint short. Thorax black, grayish pollinose, bearing four black vittae; four dorsocentral macrochaetae; scutellum black at base, the apex yellowish and bearing three long and one shorter apical pair of bristles. Sternopleura with two bristles. Abdomen mostly yellow excepting a black vitta on the dorsum and a similar one on the venter; no true discal macrochaetae present, although the abdominal hairs are long and erect and almost attain the size of macrochaetae. Legs brown, mid tibiae bearing one bristle on the outer front side near the middle; hind tibiae short ciliate. Wings normal, the third vein bearing two bristles at its base. The puparium of this species has the anal stigmata protruding and is in this respect similar to *Zenillia cheloniae* Rondani.

Length 8 to 9 mm.

Described from two male specimens reared at the gypsy moth laboratory, from *Malacosoma disstria* Huebner. Material collected at Rockingham, Vermont, June 21, 1915, by J. J. Culver, the flies issuing July 23–25, 1915.

Type.—Male, Cat. No. 25699 U.S.N.M.

ZENILLIA HELVINA Coquillett.

Exorista helvina COQUILLETT, Revis. Tachin., 1897, p. 96.—JOHNSON, Cat. Ins. New Jersey, 1899, p. 672; ed. 2, 1909, p. 780.—SLOSSON, Ent. News, vol. 9, 1898, p. 252.—TOTHILL, Canad. Ent., vol. 45, 1913, p. 71.

Thorax and abdomen golden pollinose; discal macrochaetae usually confined to the third segment; mid tibiae with two bristles.

Front of male 0.264–0.296 and in the female 0.320–0.340–0.333 of the head width; face and front usually yellowish pollinose, the former sometimes silvery, face wider than front; bucca one-fifth the eye height; palpi yellow, normal; facial ridges hairy on lowest fourth; antennae nearly as long as face, the third joint in male four and one-half and in the female three and one-half times the second; arista gradually tapering from base to apex, penultimate joint short. Thorax black, yellowish pollinose marked with four black vittae and bearing usually four dorsocentral macrochaetae, sometimes three; sternopleura with three bristles; scutellum yellow pollinose bearing four long pairs of marginal bristles, the apical being of the same size as the other three; also a strong pair on disk. Abdomen wholly yellow pollinose, the apex of segments two, three and four sometimes blackish, but there is no definite line of demarcation; discal macrochaetae usually present on the third segment although sometimes reduced to erect bristly hairs; in some specimens discal bristles are present on both of the intermediate segments. Legs usually black, the tibiae sometimes yellow; mid tibiae with two strong bristles on the outer front side near the middle; hind tibiae coarsely ciliate, with two or more longer bristles. Third vein with three or four bristles at its base. Hypopygium black, inner forceps long, curving inwardly and tapering to a fine point, outer forceps shorter, about three-fourths the length of the inner ones, slender and tapering as the others.

Redescribed from several specimens of both sexes: the type is from White Mountains, N. H. (Morrisson); one from Crawford's and three from Franconia, N. H. (Mrs. Slosson); one White Mountains, New Hampshire, and one Spot Pond, Massachusetts (Townsend); one Seattle, Washington (Aldrich). There is also a series in the gypsy moth laboratory, Melrose Highlands, Massachusetts. Johnson lists it from New Jersey. The only rearing record is reported by Tothill, the host being *Amphidasia cognataria* Guenée, at Coldstream, British Columbia.

Type.—Male, Cat. No. 3624, U.S.N.M.

ZENILLIA OCHRACEA Van der Wulp.

Exorista ochracea VAN DER WULP, Biologia Centrali-Americana, Diptera, vol. 2, 1890, p. 63.

Chrysomasicera borealis TOWNSEND, Journ. New York Ent. Soc., vol. 23, 1915, p. 230.

Thorax and abdomen golden pollinose, the latter with the apical margins of last three segments polished black; mid tibiae with one bristle on the outer front side near the middle.

Front of male 0.280 and in the female 0.326 of the head width; front mostly golden pollinose, the face less so, silvery in some specimens; facial ridges bristly on the lowest third; bucca one-fifth the eye height; face wider than front; antennae nearly as long as face, third joint in male five times the second and in the female slightly less; arista gradually tapering from base to apex, the penultimate joint short. Thorax yellowish pollinose marked with four fine black vittae; four dorsocentral macrochaetae; scutellum yellowish bearing two or three pairs of long bristles besides the very short fine pair of apical ones which are cruciate and turned upward. Sternopleura with three bristles. Abdomen with weak discal bristles on the second segment and stronger ones on the third, the fourth segment has a marginal and submarginal row of macrochaetae, first segment black, remaining ones yellow pollinose except on apical fourth which is opaque black, sharply contrasting. Legs black; mid tibiae bearing but one bristle on the front side near the middle; hind tibiae weakly

ciliate with one longer bristle. Front pulvilli twice the length of those of the hind tarsi.

Redescribed from eight specimens: the type of *Chrysomasicera borealis*, which is a male taken at "Top of Las Vegas Range, New Mexico, June 28" (Cockerell); one female, allotype of the same, Las Vegas Hot Springs, New Mexico, August 9 (Barber); one female, Mexico City (Roberto Müller); five females, Hell Canyon, Manzano National Forest, New Mexico, September 19, 1916, on foliage of oak (Townsend). The last are considerably smaller than the rest. The allotype bears Coquillett's identification as *ochracea* Van der Wulp, which in this case seems considerably more certain than in most of Wulp's species. Cockerell noted "In life brilliant golden shot with green," and Wulp records a similar observation about the green tinge by H. H. Smith, who collected his material.

The type of *ochracea* is in the British Museum; that of *borealis* is Cat. No. 19613, U.S.N.M.

ZENILLIA MARGINATA, new species.

? *Chrysoexorista viridis angustifrons* TOWNSEND, Bull. Amer. Mus. Nat. Hist., vol. 35, 1916, p. 21.

Thorax and abdomen wholly golden pollinose; with three sternopleural bristles; fourth segment of the abdomen with two rows of macrochaetae; apices of the intermediate segments black.

Front of female 0.28 of the head width; front golden pollinose the face slightly less so, sides of the former sparsely haired; facial ridges bristly on the lowest fifth; bucca grayish pruinose with yellowish tinge, about one-sixth the eye height; palpi yellow; antennae nearly as long as face, the third joint three times the length of second, arista thickened on the basal third, penultimate joint short. Thorax black, yellowish pollinose bearing four black vittae; three or four dorsocentral macrochaetae present; scutellum yellowish with three long and one shorter pair of apical bristles. Sternopleura with three bristles. First segment of the abdomen black, intermediate segments golden pollinose, their narrow apical margins polished black; fourth segment wholly golden pollinose; venter black, gray pollinose. Discal and marginal macrochaetae present on all segments but the first, which has only the marginals. Legs black; mid tibiae bearing one stout bristle on the outside near the middle; hind tibiae evenly ciliate with one longer bristle. Anterior portion of the wings brownish; third vein with two bristles at its base.

Length 7 mm.

Described from one female collected at Boulder, Colorado, October 13, 1917 (Cockerell). Another female probably belonging to the species is from Cornelia, Georgia, under Codling Moth band (*Car-*

pocapsa pomonella Linnaeus) August 30, 1921 (E. R. Van Leeuwen); it has four dorsocentrals, and the abdomen is a little less golden.

We have seen only males of Townsend's *angustifrons;* they are from Brazil and Bolivia, and have the black posterior bands of the second and third abdominal segments wider, but otherwise are hardly distinguishable. Females from South America would probably settle the question. The South American species is known to vary in the number of dorsocentrals.

Type.—Female, Cat. No. 25700, U.S.N.M.

ZENILLIA ANGUSTIVITTA, new species.

Thorax and abdomen wholly golden pollinose; with two sternopleural bristles; fourth segment of the abdomen destitute of macrochaetae.

Front at vertex 0.28 of the head width, much wider at antennae; front golden, the face white pollinose; frontal vitta narrower than one parafrontal; facial ridges bristly on the lowest fourth; bucca about one-fifth the eye height and clothed with dense fine white hairs; the lower border bearing two or three strong black hairs below the vibrissae; palpi pale yellow bearing but a few black hairs; antennae nearly as long as the face, the third joint two and one-fourth times the second; arista thickened on the basal third, the penultimate joint shorter than long. Thorax black, deep yellow pollinose with four black vittae, the outer ones broken at the suture; three dorsocentral macrochaetae; scutellum concolorous, bearing three long pairs of marginal and a backward-turning pair of apical bristles; sternopleura with two bristles. Abdomen red in ground color throughout except for a trace of a median dorsal dark vitta; marginal macrochaetae on the first segment, discals and marginals on the intermediate ones; the fourth bearing several irregular rows of bristles one-half the length of the macrochaetae of the third segment. Fourth segment of the abdomen as long as the third, yellowish, the pollen golden. Coxae and femora yellow, tibiae brown and tarsi black; mid tibiae with one bristle on the front side near the middle; hind tibiae coarsely ciliate, with one or two longer bristles. Third vein with two or three bristles at its base.

Length 8 mm.

Described from one female collected at Staten Island, New York.

Type.—Female, Cat. No. 25701, U.S.N.M.

ZENILLIA COQUILLETTI, new species.

Exorista angustata VAN DER WULP, Coquillett, Revis. Tachin., 1897, p. 99.

Front of male 0.32 of the head width, white pruinose, the sides sparsely haired and bearing a few longer bristles outside the frontal row; face silvery pollinose; bucca one-fifth the eye height; palpi black at base, the extreme tips yellow; facial ridges bristly on the lowest fourth; antennae nearly as long as the face, the third joint three and one-half times the second, arista thickened on basal third, the penultimate joint short. Thorax black, gray pollinose, marked with four black vittae and bearing three dorsocentral macrochaetae; scutellum black, gray pollinose with three marginal pairs and an apical pair of bristles. Sternopleura with three bristles; pteropleural bristle quite well developed, nearly as long as those of the sternopleura. Abdomen destitute of discal bristles; first segment black; second and third black at apex, the remainder gray pollinose; fourth segment shining black, except at sides; marginal macrochaetae stout, the first two segments with one pair, third with marginal row, the fourth bristly on the apical half; abdominal hairs depressed; mid tibiae with one stout bristle on the outer front side near the middle; hind tibiae subciliate at most. Third vein with two or three bristles at its base.

Length 10 mm.

One male, from Texas (Belfrage).

Type.—Male, Cat. No. 25702, U.S.N.M.

ZENILLIA LOBELIAE Coquillett.

Exorista lobeliae COQUILLETT, Revis. Tachin., 1897, p. 97.—BRIMLEY, Ent. News, vol. 33, 1922, p. 22.—REINHARD, Ent. News, vol. 32, 1921, p. 72.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, 1922, p. 11, fig. 18 (puparium).

Facial ridges bristly on the lowest half; four sternopleural bristles are present; palpi yellow; mid tibiae with two bristles on the outer front side near middle.

Front in male 0.27 (one specimen), in female 0.33 to 0.36 (in three) of the head width; face and front silvery pollinose, the sides of latter sparsely covered with short hairs; bucca about one-sixth the eye height; facial ridges usually bristly on the lower half although sometimes only on one side; both ridges are always ciliate on more than the lowest third; antennae nearly as long as the face, the third joint four times as long as the second; arista thickened on the basal three-sevenths, the penultimate joint short; palpi yellow. Thorax gray pollinose marked with four black vittae and bearing four dorsocentral macrochaetae; scutellum black, gray pollinose and yellowish at the tip, with two long pairs of marginal bristles and a short pair between them; the apical pair decussate, of moderate size, the disk with one pair of bristles and numerous spiny erect hairs. Sternopleura with four distinct bristles. Abdomen destitute of discal macrochaetae, although the third segment sometimes has a few stout bristles which approach macrochaetae in size; black, gray pollinose on the last three segments excepting the narrow, ill-defined apices, which are black. Mid tibiae with two bristles on the outer front side near the middle; hind tibiae outwardly ciliate. Third vein with two bristles at base.

Length 5.5 to 8 mm.

Redescribed from the type series of one male and six females (not two males and five females as given by Coquillett); the type and one other female are from Virginia, and were reared by Koebele from *Acronycta hamamelis* Guenée, emerging August 8, 1882; one male and three females are from Maryland, reared from an *Acronycta* on oak, July 28 and 31, 1882; one female without locality was reared from *Acronycta lobeliae* Guenée, April 21, 1885. The specimen reared from *Orgyia*, mentioned by Coquillett, is not now in the Museum or has been placed elsewhere. One much larger female from Virginia (Dyar) was reared from *Acronycta;* and one female without rearing record is from Lafayette, Indiana (Aldrich). Reared from *Alabama argillacea* Huebner at College Station, Texas, by Reinhard.

The species is intermediate between *Phorocera* and *Zenillia* in the bristles of the faciala, hence has been referred to in both tables; it is also intermediate between those species with discals and those without, making it difficult to place satisfactorily in the table of species. The Indiana specimen has a pair of distinct discals on the third segment.

Type.—Female, Cat. No. 3595, U.S.N.M.

ZENILLIA VALENS, new species.

Front in male 0.25 to 0.27 of the head width (in three), parafrontals from the vertex with uniform yellowish pollen, parafacials paler yellow; frontal bristles about 10, only the upper one reclinate, and it is much stouter than several next in front of it; lowest frontals reaching level of base of third joint, facial ridges with feeble bristles ascending to middle of third antennal joint; antennae black, third joint two and a half times the second, not quite reaching the vibrissae. Palpi yellow, arista thickened on basal two-fifths. Thorax gray pollinose with the usual changeable stripes indistinct. Dorsocentrals 4, sternopleurals 3; scutellum with three lateral (the middle one small) and a small pair of apicals. Abdomen with rather thin gray pollen extending to the hind margins of the segments, showing a changeable median dark stripe; second and third segments with large erect scattered hairs which almost approach the size of discal bristles; fourth segment with the same kind of hairs and some undoubted discal bristles; genitalia small, the inner forceps separate, thick, minutely hooked at apex on front side, outer forceps shorter, less thick, with several minute retrorse hooklets on front near apex. Legs black, mid tibiae with two or three bristles on outer front side, hind tibiae ciliated on outer side, with one larger bristle about middle. Wings subhyaline, fourth vein obliquely curved without fold, ending considerably before apex; third vein with one or two setules at base.

Length 10 to 10.5 mm.

Described from three males; one Holland Hills, Long Island, New York, emerged from puparium June 4, 1911; one Pennyquid Barrens, New York, July 8, 1920 (American Museum of Natural History); one Germantown, Pennsylvania (Harbeck), September 24, 1905.

Type.—Male, Cat. No. 25703, U.S.N.M., from Holland Hills, New York.

The type has the puparium attached, which is identical with that of *lobeliae*, as figured by Greene.[7] The latter, however, is a much smaller species with depressed hair on the second and third abdominal segments.

ZENILLIA EUDRYAE Townsend.

Exorista eudryae Townsend, Trans. Amer. Ent. Soc., vol. 19, 1892, p. 287.—Coquillett, Revis. Tachin., 1897, p. 100.—Townsend, Annals Ent. Soc. Amer., vol. 8, 1914, p. 89; Proc. Biol. Soc. Wash., vol. 28, 1917, p. 21.—Tothill, Canad. Ent., vol. 45, 1913, p. 70.—Greene, Proc. U. S. Nat. Mus., vol. 60, art. 10, 1922, p. 11, fig. 27 (puparium).

Oxexorista thompsoni Townsend, Proc. Ent. Soc. Wash., vol. 14, p. 165.

Only the uppermost pair of frontal bristles reclinate; thorax and abdomen usually with a bluish tinge; hind tibiae thickly ciliate; bucca one-sixth the eye height.

Front of male from 0.20 to 0.25, and in the female from 0.30 to 0.33 of the head width; face and front silvery, the latter with vitta as wide as either parafrontal; facial ridges bristly on the lowest third (if bristly one-half way up, see *lobeliae*), bucca one-sixth the eye height; palpi yellow, thickly beset with short black hairs which are longer at base; third joint of antennae of female scarcely three times as long as the second, but little longer in the male; arista thickened at base the penultimate joint short. Thorax black, with a bluish tinge and lightly sprinkled with gray pollen; five narrow black vittae, the outer ones interrupted at the suture; four dorsocentral macrochaetae; scutellum at the tip somewhat yellowish, the disk covered with erect hairs and bearing three or four pairs of long marginal bristles besides the shorter apical pair. Sternopleura thickly clothed with fine hairs and bearing three bristles. Abdomen black, faintly grayish pollinose with distinct bluish tinge, destitute of discal macrochaetae, the first and second segments with one pair each of median marginal macrochaetae, the third a marginal row and the fourth a marginal and submarginal row; third abdominal segment of male with a small dense patch of hairs underneath on each side, a good character. Mid tibiae bearing two bristles on the outer front side near the middle; hind tibiae densely ciliate with or without one longer bristle. Third vein with two bristles near its base.

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[7] Proc. U. S. Nat. Mus., 1921, vol. 60, art. 10, fig. 18.

Length 8 to 10 mm.

Redescribed from the following material:

(1) A female from Ithaca, New York, out of the type lot, bred by Prof. J. H. Comstock from *Eudryas* (now called *Euthisanotia*) species. This specimen was donated to the Museum by W. R. Walton, who obtained it from Cornell University.

(2) A female from Dayton, Ohio, reared from *Euthisanotia unio* Huebner by Dr. H. S. Jewett. This specimen bears Coquillett's label as *Exorista eudryae;* Townsend erected for it the genus *Oxexorista* in 1912, referring to *eudryae* as the type of this genus but having this specimen in view. Later (1917) believing it misidentified he proposed for the specimen without description the specific name *thompsoni* (Type No. 19136, U.S.N.M.), and proposed to change the genotype of *Oxexorista* from *eudryae* to *thompsoni.* We fail to find after prolonged comparisons that this specimen is a different species from the remainder of the series.

(3) A male labeled "Bred from *Eudryas grata* from Saunders," no locality (Riley collection). This was selected by Townsend as the true *eudryae* when he separated *thompsoni*, and it is without doubt that species, although we believe his *thompsoni* is also.

(4) A large male from Kaslo, British Columbia (Currie), which was compared with the type for us by Prof. P. B. Lawson at the University of Kansas. The type has been examined by the senior author, but not with reference to certain characters found afterwards. Professor Lawson kindly made the desired comparison; this was before we had discovered the type-lot specimen in the Walton collection, which confirmed his conclusion.

(5) Two specimens reared at North East, Pennsylvania, from *Euthisanotia grata* Fabricius by D. Iseley. One reared from the same host at Raleigh, North Carolina, collector not known. Two from the gypsy moth laboratory, one reared from *Alypia octomaculata* Fabricius in Massachusetts. One bred from *Acronycta* species at St. Louis, Missouri, by C. V. Riley. One from Plummer Island, Maryland (Shannon, 1913).

The species has been reported from New Jersey (Smith Cat.); Axton, New York (McGillivray and Houghton); Kansas (F. H. Snow); Ottawa, Canada (Gibson); North Carolina (Brimley); Quebec, Canada (Winn and Beaulieu); Connecticut (Britton). Brimley reared it from *Euthisanotia grata* Fabricius and *unio* Huebner and from *Estigmene acraea* Drury. Tothill reared it from *Euthisanotia grata* Fabricius at Ottawa. Unpublished records on specimens identified in the Museum include rearing from *Automeris io* Fabricius at Wallingford, Connecticut, by B. A. Porter.

Type.—In the University of Kansas.

ZENILLIA COERULEA, new species.

Front of male at vertex 0.27 of the head width (the same in two specimens); the sides of front bearing a few inconspicuous hairs, as wide as the vitta; frontal bristles reach the third antennal joint, the two uppermost stout and reclinate; inner and outer vertical bristles well developed; face and front silvery; facial ridges bristly on the lowest fourth; bucca one-eighth the eye height, sparsely haired excepting the stout bristles of the lower border; palpi normal, yellow, thickly clothed with fine black hairs; antennae five-sixths the length of face, second joint elongate, the third hardly twice the length of the second, arista slightly thickened on the basal third, the penultimate joint short. Thorax black, subshining, thinly gray pollinose marked with four black vittae; four dorsocentral macrochaetae; scutellum black, gray pollinose bearing three long pairs of marginal bristles and a large cruciate apical pair; the disk is covered with numerous, short erect hairs and bears a pair of widely separated bristles smaller than the apical ones. Sternopleura with three bristles. Abdomen black, gray pollinose, all of the first, narrow apical margins of the second and third and the tip of the fourth segments shining black. No true discal macrochaetae, although the abdominal hairs are rather long and erect, the first segment has one pair, second segment with two or three pairs of stout marginal macrochaetae, the third with a marginal row and the fourth wholly covered. Legs black, mid tibiae with two or more bristles on the outside near the middle; hind tibiae with bristles of uneven length and not at all comblike. Wings hyaline; apical cell widely open, bend of last section of fourth vein a little rounded, third vein with two bristles at its base.

Length 10 to 12 mm.

Described from four female specimens reared at the Gypsy Moth Laboratory from *Cimbex americana* Leach. Material collected July, 1919, at Auburn, Massachusetts, by William Eels, the Tachinids issuing June 29 and July 12, 1920.

Type.—Cat. No. 25704, U.S.N.M.

ZENILLIA FORMOSA, new species.

Front of male 0.23 to 0.26 and in the female 0.30 to 0.33 of the head width; the sides gray pruinose, sparsely haired; frontal bristles reach the base of the third antennal joint, the two uppermost ones stout and reclinate, the penultimate one longest; inner vertical strong, the outer one vestigial in the male: face silvery pruinose, facial ridges bristly on the lowest fourth; bucca one-twelfth the eye height, bearing only a few hairs besides the stout bristles of the lower border; palpi yellow, quite thickly clothed with fine black hairs; antennae nearly as long as the face, the third joint of male nearly four times and in the female at least three times the length of the second, arista slightly thickened on the basal third, the penultimate joint short. Thorax black, gray pollinose marked with four black vittae, the outer ones broken at the suture; four dorsocentral macrocraetae; scutellum yellowish with the pollen grayish, bearing three pairs (sometimes four) of long marginal bristles besides the large backward directed, apical pair; in most specimens the apical pair are cruciate, although they are not so in one instance. Sternopleura clothed with fine long hairs and bearing three stout bristles. Abdomen stout, the first segment black, the remaining ones black, gray pollinose the apical portions of these segments less pollinose and often blackish, the fourth segment at apex at least is subshining, black; sides of the intermediate segments sometimes slightly yellowish; abdomen never with a bluish tinge. No discal macrochaetae on the abdominal segments. First and second segment have one pair each of median marginal macrochaetae; third with a marginal row of uncommonly stout ones, the fourth quite thickly covered with shorter bristles and bearing two irregular rows of macrochaetae on the apical half; abdominal hairs subdepressed. Venter of the third abdominal segment of male destitute of a small patch of hairs. Legs black; mid tibiae bearing two or more bristles on the outer side near the middle; hind tibiae densely ciliate.

Length 10 to 12 mm.

Described from 12 specimens of both sexes; two were reared from *Automeris io* Fabricius at West Medford, Massachusetts, issuing May 31, 1895; four were reared from *Agrotis ypsilon* Rottemburg, in Missouri by C. V. Riley; the others from Lehigh Gap, Pennsylvania (Greene); Melrose Highlands, Massachusetts (Townsend); Glen Echo, Maryland (Aldrich); Lafayette, Indiana (Aldrich); and White Mountains, New Mexico (Townsend).

Mr. E. G. Reinhard has contributed two additional female specimens, reared by him from *Automeris io* Fabricius at Woodstock, Maryland.

Type.—Male, Cat. No. 25705, U.S.N.M., from West Medford, Massachusetts.

ZENILLIA INFLATIPALPIS, new species.

With discal macrochaetae; palpi swollen; three sternopleural bristles; four dorsocentral bristles.

Front of female 0.27 of the head width at vertex; at epistoma the eyes are separated by 0.45 of the head width, much less than usual;

front and face silvery, the sides of former sparsely haired; frontal bristles reach the base of third antennal joint, the two uppermost ones stout and reclinate; face and front nearly of equal width, bucca one-twelfth the eye height; facial ridges bristly on the lowest fourth; palpi yellow, swollen at tip and sparsely haired; antennae nearly as long as face, the third joint two and one-fourth times the second; arista tapering from base to apex, the penultimate joint short. Thorax black, gray pollinose, marked with four black vittae and bearing four dorsocentral macrochaetae. Scutellum black, gray pollinose, the tip yellowish, bearing three long and one shorter apical pair of marginal bristles. Sternopleura with three bristles. Abdomen with discal and marginal bristles, the fourth segment, excepting the extreme base, with stout bristles all over; first segment wholly black, the remaining ones gray pollinose at base. Legs black; mid tibiae bearing two bristles on the outside near the middle; hind tibiae ciliate, with two or three longer bristles. Wing venation as usual, excepting that the last section of the fourth vein is strongly arcuate; third vein with two bristles at its base.

Length 10 mm.

Described from one female specimen collected at Great Falls, Virginia.

Type.—Female, Cat. No. 25706, U.S.N.M.

A second female, collected at Lafayette, Indiana, September 14, 1917 (Aldrich), differs in only one character; it has no discal macrochaetae on the abdomen. The width of the front is the same. The correspondence is so complete that we feel compelled to regard the species as the same.

ZENILLIA POLITA Coquillett.

Exorista polita COQUILLETT, Revis. Tachin., 1897, p. 99.

Abdomen black and shining; basal fourth of segments two and three thinly gray pollinose at most; closely related to *Zenillia setinervis*, but does not have the third vein bristly to the small crossvein.

Front in male 0.257 of the head width; face and front silvery pruinose, the latter darker above, thickly clothed with fine bristly hairs; three reclinate bristles on each side above; bucca one-eighth the eye height; facial ridges bristly on the lowest fourth; antennae as long as face, the third joint about five times the length of second; arista slender, hardly thickened on the basal fourth; penultimate joint short; palpi yellow. Thorax bearing four dorsocentral macrochaetae, thinly whitish pollinose with four black vittae; scutellum bearing three long pairs of marginal and a shorter, cruciate apical pair of bristles; sternopleura with three bristles. Abdomen destitute of discal macrochaetae, black, shining, with a bluish tinge, the narrow bases of the intermediate segments white pollinose; abdominal hairs rather long and suberect. Mid tibiae bearing one bristle on the front side near the middle; hind tibiae ciliate.

Length 7 mm.

Redescribed from the type, a male collected October 17, 1896, by G. R. Pilate, Tifton, Georgia. Apparently no other specimens have been found.

Type.—Cat. No. 3598, U.S.N.M.

ZENILLIA SETINERVIS Coquillett.

Exorista setinervis COQUILLETT, Proc. Ent. Soc. Wash., vol. 12, 1910, p. 129.

Third vein bristly to the small crossvein; abdomen black, shiny, the base of the intermediate segments gray pollinose; palpi yellow; mid tibiae with one bristle on the outer side near middle.

Front in male 0.230 and in the female 0.268 of the head width; face and front silvery pollinose, the latter clothed with short bristly hairs; bucca one-sixth the eye height; antennae as long as face, the third joint in the male five times and in the female four times the second, the arista thickened on the basal one-fifth; facial ridges bristly on the lowest one-third. Thorax black, gray pollinose marked with four black vittae; three dorsocentral macrochaetae present and two sternopleural bristles; scutellum with three pairs of marginal bristles and a very short pair of apical ones. Abdomen black and polished, excepting the narrow bases of the second and third segments which are bluish white pruinose. No discal macrochaetae present. Mid tibiae bearing a single bristle on the outside near the middle; hind tibiae not ciliate. Pulvilli brown, long in male, short in female.

Length 6 mm.

Redescribed from the type, a male from Clarksburg, Tennessee (Morgan), and a female from Raleigh, North Carolina (Sherman).

Type.—Male, Cat. No. 13097, U.S.N.M.

Subgenus PHRYXE.

ZENILLIA VULGARIS Fallén.

Tachina vulgaris FALLÉN, Kongl., Svenska Vetensk. Akad. Handl., vol. 31, 1810, p. 275; Dipt. Sueciae, Muscides, 1820, p. 62.—ZETTERSTEDT, Ins. Lapponica, 1838, p. 644; Dipt. Scandinaviae, vol. 3, 1844, p. 1139.

Phryxe athaliae and 21 other species, ROBINEAU DESVOIDY, Myodaires, 1830, pp. 159–170; more than 200 additional specific names with "description" in Dipt. des Environs de Paris, vol. 1, 1863, pp. 329–458. According to Professor Bezzi, Katalog der palaearkt. Dipt., vol. 3, 1908, there are in these two works no fewer than 245 synonyms of *Phryxe vulgaris*.

Exorista vulgaris MEIGEN, Syst. Beschr., vol. 7, 1838, p. 255.—COQUILLETT, Revis. Tachin., 1897, p. 93.—TOTHILL, Canad. Ent., vol. 45, 1913, p. 71.

Exorista hirsuta OSTEN SACKEN, Canad. Ent., vol. 19, 1887, p. 163.—WILLISTON, in Scudder's Butterflies of New England, vol. 3, 1889, p. 1919, pl. 89, figs. 13–15.—TOWNSEND, Psyche, vol. 6, 1893, p. 467.

Blepharidea vulgaris RONDANI, Dipt. Ital. Prodromus, vol. 1, 1856, p. 67.—BRAUER and BERGENSTAMM, Zweifl. Kais. Mus. Wien, pt. 4, 1889, p. 88, pl. 2, fig. 18; pt. 5, 1891, p. 338; pt. 6, 1893, pp. 114, 117.

Front in both sexes wider than one eye; scutellum at least at tip yellow; palpi black; mid tibiae with two bristles on the front side near the middle.

Front of male 0.40 to 0.41 (three specimens) and in the female the same (three specimens) of the head width; front and face silvery, the vertex blackish; bucca one-fourth the eye height; facial ridges with delicate bristles on the lowest third usually, sometimes reaching halfway; frontal bristles strong, descending on sides of face nearly halfway to the vibrissae; antennae five-sixths the length of face, the third joint in male four and in the female two and one-fourth to three times the second; arista strongly thickened to the middle; the penultimate joint decidedly elongate in most males, hardly at all in most females and a few males. Thorax black, gray pollinose, bearing usually four dorsocentral macrochaetae, sometimes three; scutellum black at base the broad apex usually and the tip always yellowish, bearing three long pairs and a shorter upturned pair of apical bristles. Sternopleura with three bristles. Abdomen black, subshining, the bases of last three segments gray pollinose, sometimes the fourth segment wholly shining black. Discal macrochaetae present on the intermediate segments, the fourth with three or four rows. Mid tibiae always with two and sometimes three, bristles on the outside near the middle; hind tibiae subciliate, the bristles of uneven length. Third vein with two or three bristles at base. Hypopygium black, both pairs of forceps short and about the same length, the inner ones fused together on their basal two-thirds and each tapering to a fine point, outer forceps thick, each nearly equal to the width of the inner pair and ending in a blunt point; base of outer forceps yellowish; inner forceps densely hairy on the outer sides.

Length 7 to 9 mm.

Redescribed from a very long series of North American specimens and a few from Europe, the latter determined by Professor Bezzi, Brunetti, and Brauer and Bergenstamm. The North American material is mostly from New England, but there are also specimens from New York, Idaho, Washington, and British Columbia. The type of *hirsuta* is in the Museum of Comparative Zoology, Cambridge, Mass., and has been examined by the junior author. It was bred from *Pieris rapae* Linnaeus by Lintner, presumably in New York. Coquillett had already made out the synonymy from the description. Townsend reported *hirsuta* reared from *Pyrausta penitalis* Grote by Forbes in Illinois. Tothill mentioned *Tortrix* (*Harmo-*

loga) *fumiferana* Clemens as a common host in Canada. At the gypsy moth laboratory it has been reared again from *Pieris rapae* Linnaeus.

ZENILLIA CAESAR Aldrich.

Exorista nigripalpis TOWNSEND, Psyche, vol 7, 1896, p. 330, not of Macquart, 1846.—COQUILLETT, Revis. Tachin., 1897, p. 98.—GIBSON, Rept. Ent. Soc. Ont., for 1918, p. 117.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, p. 11, 1922 (puparium).

Exorista caesar ALDRICH, Canad. Ent., vol. 48, 1916, p. 20.—CAESAR, 46th Rept. Ent. Soc. Ont., 1916, p. 173.

Front of male 0.27 to 0.29 (in three) and in the female 0.31 to 0.33 (in three) of the head width; front and face silvery pollinose; the former blackish at vertex; bucca one-sixth the eye height; facial ridges bristly on the lowest third; antennae variable in length, sometimes reaching the oral margin but usually about five-sixths the length of face; third joint in male varying from two to three and in the female from one and one-third to two and three-quarters times the second; arista thickened on the basal third the penultimate joint usually elongate. While this character is not a constant one it will hold true in the majority of forms. Thorax black, thinly gray pollinose bearing four dorsocentral macrochaetae; scutellum black with three long and one short apical pair of bristles, the latter pair curving backward; sternopleura with three bristles. Abdomen black, somewhat shiny, the bases of the last three segments lightly gray pollinose, the fourth nearly always shining black; discal macrochaetae present on the intermediate segments, the fourth wholly bristly excepting the base; abdominal hairs suberect in male, depressed in the female. Mid tibiae with one or two bristles on the outside near middle; hind tibiae ciliate with one longer bristle. Third vein with one or two bristles at base. Hypopygium black, inner forceps decidedly longer than the outer ones, in profile they are rounded outwardly at base, concave near the middle and then curving inward and ending in a slender point; outer sides sparsely haired; outer forceps shorter, about three-fourths as long as the inner ones terminating in a blunt point, their base yellowish.

Redescribed from a long series of specimens; three paratypes of *ceasar*, reared from *Cacoecia argyrospila* Walker at Simcoe, Ontario, by Prof. Lawson Caesar; a series reared at Canyon City, Colorado, by J. B. Gill, from the same host; one from *Loxostege sticticalis* Linnaeus at Greely, Colorado, by A. E. Mallory; several from *Pyrausta nubilalis* Huebner at West Medford and neighboring places in Massachusetts; several reared from *Crambus trisectus* Walker at Lafayette, Indiana, by W. H. Larrimer; collected specimens from New England; Tennessee Pass, Colorado; Koehler, New Mexico.

Caesar reports it an abundant parasite of *Cacoecia* in Ontario; in Walton's unpublished index it is recorded from *Cacoecia argyrospila* Walker at Wenatchee, Wash., reared by Newcomer.

The type of *nigripalpis* is in the University of Kansas, where it was examined by the senior author.

Paratype (of *caesar*).—Male, Cat. No. 25694, U.S.N.M.

ZENILLIA CRASSISETA, new species.

Front in both sexes golden pollinose; palpi black; scutellum yellowish; front in both sexes at vertex less than the eye width.

Front of male 0.23 and 0.26 and in the female 0.30 the head width, golden pollinose in both sexes, the vertex rarely blackish; frontal vitta narrower than the parafrontals; frontal bristles reach below the base of third antennal joint, the two uppermost reclinate in the male, three in the female; parafacials silvery; facial ridges bristly on the lowest fourth; bucca one-seventh the eye height; third antennal joint in the male hardly three times and in the female two and one-fourth times the second, arista very slender, hardly at all thickened on the basal fifth, the penultimate joint short (in one specimen somewhat elongate). Thorax black, dusted lightly with yellowish pollen and marked with four black vittae; four dorsocentral macrochaetae; scutellum black at base, yellowish at the tip, bearing three long pairs of marginal and a shorter upturned pair of apical ones, the pair next the apicals very long, stout at base, reaching to the third abdominal segment. Sternopleura with three bristles. Abdomen black, the hind margins of segments two and three, a median stripe on the second, and the apical half of the fourth polished black. Discal macrochaetae present on the intermediate segments, the fourth with two or three rows, those on the apical half strongest; marginal bristles long and stout at base; abdominal hairs erect in the male, depressed in female. Mid tibiae with two bristles on the outer front side near middle; hind tibiae unevenly ciliate. Last section of fourth vein arcuate on the basal three-fourths; third vein with two bristles at its base.

Length 7 to 8 mm.

Described from four specimens, two of each sex collected at Lafayette, Indiana, and North Andover, Massachusetts.

Type.—Male, Cat. No. 25695, U.S.N.M., from Lafayette, Indiana.

ZENILLIA TRISETOSA Coquillett.

Exorista trisetosa COQUILLETT, Proc. U. S. Nat. Mus., vol. 25, 1902, p. 110.

Distinguished from all others of this group by the presence of a long costal spine.

Front of male 0.34 (in two) and in the female 0.35 (in two) of the head width; parafrontals black when viewed from in front, thinly gray pollinose from the side; frontal bristles in a single row extending below the level of the arista, facial ridges bristly on the lowest fourth or third; face gray pruinose below the row of frontals; palpi black; bucca one-third the eye height; shining black below the impression; antennae slightly shorter than face, the third joint hardly twice the length of the second, arista thickened on more than basal half, penultimate joint slightly elongate. Thorax black, lightly dusted with a bluish gray pollen bearing three dorsocentral macrochaetae; scutellum black with three pairs of long lateral and one rather long apical pair of bristles; sternopleura with three bristles. Abdomen black, subshining, first segment wholly black, the remaining ones whitish pollinose at their base; one pair of weak marginal macrochaetae on the first segment, the second with one pair each of median discal and marginal, the third with one pair median discals and a marginal row and the fourth wholly covered with macrochaetae. Legs black, bristly, mid tibiae with two or three stout bristles on the outer front side; hind tibiae with many bristles of different length—not ciliate. Wings hyaline, costal spine strong, the third vein slightly sinuate, widening the apical cell beyond its middle, and bearing three or four bristles at its base.

Length 5 to 8 mm.

Redescribed from the type series of seven males and a female. collected at Moscow and Lewiston, Idaho (Aldrich); and from six additional specimens from Ormsby County, Nevada (Baker); Colorado (Baker); Koehler, New Mexico (Walton); Fern Rock, Pennsylvania (Harbeck); Longmont, Colorado.

In Walton's manuscript list the species is recorded as having been reared from *Nephelodes emmedonia* Cramer at Rapatee, Illinois, by Hugo Kahl; Walton identified the specimen for the Illinois Natural History Survey.

Type.—Male, Cat. No. 6212, from Moscow, Idaho.

ZENILLIA SUBMISSA, new species.

The narrow front, thinly hairy eyes and the infuscated crossvein serve to separate this species from the others.

Front of male unusually narrow, 0.147 of the head width; when viewed from the front the face at the vibrissae is much wider than the front at the base of antennae, at least five times the width of the front at that point; face and front gray pruinose, the frontal bristles long, reaching below the base of the third antennal joint; eyes faintly hairy; facial ridges bristly on the lowest fourth; bucca one-tenth the eye height; palpi black; antennae slightly shorter than the face, the third joint two and one-fourth times the second, arista thickened on the basal third, the penultimate joint somewhat elongated. Thorax black, gray pollinose, marked with four black vittae; three dorsocentral macrochaetae; scutellum black with three pairs of marginal bristles besides the shorter upright pair of apical ones; sternopleura with four bristles. Abdomen black, gray pollinose without pattern; first segment with one pair median marginals, second with one pair each of median discal and marginal, third with one ciliate at most. Wings hyaline, the small crossvein clouded with rows on the apical half which are three-fourths as long as the macrochaetae of the third segment. Legs black, mid tibiae with two bristles on the outer front side near the middle; hind tibiae subciliate at most. Wings hyaline, the small crossvein clouded with brown, apical cell almost closed, ending nearer the wing tip than in most of the other species of this group; third vein with two or three bristles at its base.

Length 7 mm.

Described from one male specimen collected at Koehler, New Mexico, by W. R. Walton, August 14, 1913.

Type.—Male, Cat. No. 25696, United States National Museum.

Subgenus PAREXORISTA.

ZENILLIA CHELONIAE Rondani.

Exorista cheloniae RONDANI, Prod. Dipt. Ital., vol. 3, 1859, p. 120.—COQUILLETT, Revis. Tachin., 1897, p. 92.—TOTHILL, Can. Ent., vol. 45, 1913, p. 70.—GIBSON, Ann. Rept. Ent. Soc. Ont., 1911, p. 117.

Parexorista cheloniae TOWNSEND, Proc. Ent. Soc. Wash., vol. 13, 1911, p. 165; and vol. 18, 1916, p. 19.—HOWARD and FISKE, Bull. 91, Bur. Ent., 1911, p. 297.

Abdomen brownish or black, sprinkled lightly with gray pollen and without sheen; legs usually brownish; face gray pruinose.

Front of male 0.25 to 0.28 (in three), in the female 0.30 to 0.38 (in three) of the head width; face and front gray pruinose, blackish at vertex; the sides of same with many fine hairs; parafacial somewhat narrower than the parafrontal and at the narrowest part barely the width of the third antennal joint; bucca linear, one-twelfth the eye height; facial ridges bristly on the lowest fourth; palpi yellow; third joint of antennae in both sexes two and one-half to three times the length of the second; arista thickened on the basal fifth, the penultimate joint short. Thorax black, gray pollinose marked with four or five black vittae and bearing four dorsocentral macrochaetae; scutellum yellowish with four pairs of marginal bristles all of about the same size; sternopleura thickly clothed with fine hairs, and bearing two bristles. Abdomen brown or blackish (sometimes the sides of intermediate segments yellow). gray pollinose and without sheen. Discal macrochaetae present of various sizes but not arranged in pairs, blending with the erect abdominal hairs. Legs brownish, mid tibiae bearing two bristles on the front side near the middle; hind tibiae ciliate with one large bristle at middle of row. Hypopygium brownish to black, inner and outer forceps long and of even length, the former straight, parallel, except at the apex where they diverge somewhat. When viewed from behind the inner forceps appear fused for two-thirds their length.

Length 8 to 10 mm.

Redescribed from a large series; one European specimen determined by Brauer and Bergenstamm as *Parexorista cheloniae;* many reared at the gypsy moth laboratory, Melrose Highlands, Massachusetts, from *Malacosoma americana* Fabricius; two Soldier's Summit, Utah (Aldrich): Tempe, Arizona (Caffrey); Linnieville, Maryland (Shannon). It appears that some of Coquillett's material was transferred to other species after 1897, as we do not find all his localities in the collection, nor specimens connected with the hosts he mentioned. Tothill records it from *Apantesis ornata* Packard at Kaslo, British Columbia; *Malacosoma disstria* Huebner at Fredericton, New Brunswick, and at Ottawa; and from *Phragmatobia assimilans* Walker at Hymers, Ontario.

Coquillett added a note in his manuscripts that the species was reared from *Cacoecia argyrospila* Walker at Canyon City, Colorado, by J. B. Gill; and Walton's manucript list of Tachinid hosts records it from *Turuptiana permaculata* Packard at Fort Collins, Colorado, by Professor Gillette.

The biology of the species is somewhat confused. Howard and Fiske state that it attacks the brown tail moth in Europe, but not in the United States; and even imported strains adopt the habit of the American in this regard, which they suggest results from crossing. Townsend quotes Pantel that the fly lays a pediceled egg, upon the host, containing an incubated larva; but adds that in his own work at the gypsy moth laboratory the eggs were unincubated. The fact that the American specimens do not attack the brown tail moth, he says, proves them a distinct species, even though no anatomical characters have been found.

ZENILLIA RECLINATA, new species.

Front of male 0.22 to 0.25 (in three) and in the female 0.28 to 0.30 (in three) of the head width; silvery, blackish at vertex, the sides clothed with numerous short black hairs; parafacials silvery, at the narrowest part less than the width of the third antennal joint; palpi yellow; bucca linear, about one-twelfth the eye height; facial ridges bristly on the lowest fourth; antennae somewhat shorter than face, the third joint in both sexes two and one-half times the second, arista thickened on the basal fifth, the penultimate joint short. Thorax black, thinly whitish pollinose, marked with four or five black vittae and bearing four dorsocentral macrochaetae; scutellum yellowish with four pairs of marginal bristles of about the same length. Sternopleura with two bristles. Abdomen black polished (sometimes the sides of the intermediate segments yellowish) thinly white pollinose, the apical margins very narrowly shining black. Discal macrochaetae present especially on the third segment, abdominal hairs large and erect. Legs black except the tibiae, which are yellowish; mid tibiae bearing two bristles on the outer front side near the middle; hind tibiae ciliate. Hypopygium black, somewhat brownish, inner forceps curved inwardly and tapering to a fine point; outer forceps stouter, decidedly shorter and of a somewhat reddish tinge. When viewed from behind the inner forceps are distinctly separated

Length 8 to 10 mm.

Described from a long series of specimens of both sexes; most of them fall into two series, of which the first is from New England, and has been bred commonly from *Estigmene acraea* Drury. The second series was collected in New Mexico by Townsend in 1916, at Indian Spring, and at Hell Canyon, Manzano National Forest. Other specimens are from Tempe, Arizona (Wildermuth), Great Falls, Virginia (Townsend), and from Hymers, Ontario, reared from *Phragmatobia assimilans*, var. *franconica* Slosson (H. Dawson).

Type.—Male, Cat. No. 25697, U.S.N.M., from Hell Canyon, New Mexico.

ZENILLIA CURRIEI Coquillett.

Exorista curriei COQUILLETT, Revis. Tachin., 1897, p. 94.

Three dorsocentrals; discals present; orbital bristles present in the male.

Front of male 0.37 to 0.38 (three specimens) and in the female 0.35 to 0.37 (two specimens) of the head width; silvery in most specimens but often blackish at vertex, the sides sparsely haired; front somewhat prominent; orbital bristles present in both sexes; parafacials silvery pollinose, at their narrowest part about equal to the width of the third antennal joint; bucca one-seventh the eye height; palpi yellow, the base often infuscated; facial ridges bristly on lowest third, sometimes nearly half way. Antennae as long as the face, the third joint in both sexes four and one-half times the second, its apex slightly angulated and prominent above; arista thickened on the basal fourth, the penultimate joint short. Thorax gray pollinose, with three dorsocentral macrochaetae and marked with four black vittae; scutellum black except the extreme tip which is often yellowish, bearing three long and one somewhat shorter cruciate pair of apical bristles. Sternopleura with three bristles. Abdomen black, subshining; the last three segments thinly gray pollinose except on the apices; discal macrochaetae present on the intermediate segments, fourth segment bare at base, the apical three-fourths bearing three rows of bristles; dorsal abdominal hairs erect in the male, depressed in the female. Mid tibiae usually with two bristles on the outer front side near the middle, sometimes a third one is present; hind tibiae with irregularly placed bristles of uneven length. Third vein with two bristles at its base.

Length 5 to 8 mm.

Redescribed from the type, a male from University, North Dakota, (Currie) and 18 other specimens: Dallas, Texas, and Milwaukee, Wisconsin (collector unknown); Polk County, Wisconsin (Baker); Big Stone City, South Dakota; New Ulm, Minnesota; Lake Metigoshe, Turtle Mountains, North Dakota; Moscow, Juliaetta, and Lawyer's Canyon, Idaho. All collected by the senior author except as noted.

Type.—Male, Cat. No. 3752, U.S.N.M.

ZENILLIA AFFINIS Fallén.

Tachina affinis FALLÉN, Kongl. Svensk. Vet. Akad., vol. 31, 1810, and Muscides, 1820, p. 28.—MEIGEN, Syst. Beschr., vol. 4, 1824, p. 327.—ZETTERSTEDT, Dipt. Scand., vol. 3, 1844, p. 1106.

Exorista polychaeta MACQUART, Annales Soc. Ent. France, vol. 7, 1849. p. 380.

Exorista affinis MEIGEN, Syst. Beschr., vol. 7, 1838, p. 255.—COQUILLETT, Revis. Tachin., 1897, p. 94.—ADAMS, in Williston's Manual of N. A. Dipt., 1908, p. 358, fig.—TOTHILL, Canad. Ent., vol. 45, 1913, p. 70.

Fourth segment of abdomen polished black, wholly bristly; mid tibiae usually with three or more bristles on the outside near middle; male without orbital bristles.

Front of male 0.26 to 0.27 (in three), and in the female 0.31 to 0.32 (in three) of the head width; face and front silvery pollinose, the latter blackish at vertex; head only a little longer at the base of the antennae than at the vibrissae; parafacial at narrowest part one-half as wide as the third antennal joint; facial ridges bristly on the lowest fourth or rarely third; frontals extending to arista, the upper three or even four reclinate; bucca one-sixth the eye height; palpi yellow; antennae shorter than face, the third joint in male two and one-fourth and in the female about twice the length of the second; arista thickened on the basal fifth, the penultimate joint short. Thorax and abdomen black, subshining, thinly gray pollinose, the former indistinctly vittate, bearing three dorsocentral macrochaetae; scutellum yellow except the narrow basal margin, bearing three pairs of long marginal bristles and a stout apical pair. Sternopleura with three bristles. Abdomen with discal and marginal macrochaetae, the abdominal hairs long and erect, fourth segment thickly clothed all over with long bristles. When viewed in certain lights the sides and bases of the last three segments reflect gray pollinose. Mid tibiae with three or more strong bristles on the outer side near the middle; hind tibiae with many irregularly placed bristles of uneven length. Hypopygium black, the inner forceps somewhat longer than the outer ones, straight, hairy on the outside, and tapering to a fine point, superficially examined they seemed fused together.

Length 5 to 9 mm.

Redescribed from several European specimens, one determined by Brauer and Bergenstamm as *Parexorista polychaeta* Macquart; also from a larger series from New England (Webber), and other specimens from Beaver Creek, Montana (Hunter); Marshall Pass and Tennessee Pass, Colorado (Aldrich), altitudes 10,856 and 10,290 feet respectively; Emigration Canyon, Utah, altitude 6,500 feet (Aldrich), Oxford, Idaho (Aldrich). Coquillett reports it from Toronto, Canada, Tothill from Ottawa, Canada, and Washburn includes it in his Minnesota list. It has been reared from *Arctia*, species (Coquillett), and from *Phragmatobia fuliginosa* Linneaus (Tothill). Bezzi gives the extensive European bibliography and some European hosts in the Palearctic Catalogue (vol. 3, p. 239).

ZENILLIA CONFINIS Fallén.

Tachina confinis Fallén, Muscides, 1820, p. 32.—Meigen, Syst. Beschr., vol. 4, 1824, p. 274.—Zetterstedt, Ins. Lapp., 1838, p. 644, and Dipt. Scand., vol. 3, 1844, p. 1140.

Exorista confinis Rondani, Dipt. Ital. Prod., vol. 3, 1859, p. 143.—Coquillett, Revis. Tachin., 1897, p. 97.—Reinhard, Ent. News, vol. 32, 1921, p. 72.—Greene, Proc. U. S. Nat. Mus., vol. 60, p. 11, fig. 21 (puparium).

Tachina theclarum Scudder, Canad. Ent., vol. 19, 1887, p. 166.

Exorista theclarum Williston, in Scudder's Butterflies of New England, vol. 3, p. 1920.

Exorista chrysophani Townsend, Ent. News, vol. 2, 1891, p. 197.

With four sternopleural bristles, penultimate joint of the arista usually longer than broad; no discal bristles; abdomen from base of third segment shining black; palpi black; mid tibiae with two bristles.

Front in male 0.25 to 0.26 (in three), in the female 0.30 to 0.36 (in three) of the head width; face and front silvery pollinose, the latter somewhat blackish; bucca one-sixth or less the eye height; third joint of antennae in the male five and in the female three times as long as the second; penultimate joint of the arista longer than broad (in some specimens not a good character); facial ridges bristly one-third way up and sometimes halfway; palpi black. Thorax black, gray pollinose; four dorsocentral macrochaetae present; scutellum black at base but in most part yellowish bearing two long and one shorter pairs of marginal bristles and a pair of large apicals; disk densely covered with long fine erect hairs; four sternopleural bristles present. Abdomen black; in the male the second and third segments are often reddish at the sides, the second is thinly pruinose, and the third is polished black except a narrow silvery band at extreme base; in the female the abdomen is wholly black, the second and third segments broadly silvery pollinose at base, shining on about the apical half; in both sexes the fourth segment is wholly shining. Abdominal hairs erect, no discal bristles. Mid tibiae bear two and usually three strong bristles on the outside near the middle; hind tibiae ciliate. Third vein bearing two bristles at its base. Hypopygium black, inner forceps shorter than the outer ones, bearing a few fine hairs on the outer side; when viewed in profile they are decidedly concave on the hind edge, the tips pointing backward; outer forceps nearly straight, ending in a blunt point.

Length 5 to 7 mm.

Redescribed from many specimens: two cotypes of *Exorista theclarum* (Cat. No. 1421); numerous specimens from New England, and the vicinity of Washington, D. C.; Alameda, Santa Clara, and La Jolla, California; Mount Moscow, Idaho (Aldrich); Rio Tularosa, New Mexico (Townsend); Botfly Canyon, Pima Mountains, Arizona (Townsend). The European specimens determined by Brauer and Bergenstamm, mentioned by Coquillett as the basis of his determination, are not now in the National Museum. Among other localities in literature are Iowa (Townsend), Kansas (F. H. Snow), and Montreal (Winn and Beaulieu). Coquillett reported the species breeding on *Gloveria howardi* Dyar and *Brephidium exile* Boisduval and his manuscripts add *Heodes thoe* Boisduval at Ottawa, Canada, by Jas. Fletcher, and *Lycaena melissa* at Fort Collins, Colorado, by C. P. Gillette. Cockerell has bred it from *Brysbidium exile* Boisduval in the Mesilla Valley, New Mexico; Scudder reported it from *Strymon calanus* Huebner without locality; Reinhard reared it from *Strymon melinus* Huebner in Texas; Bezzi has given the European bibliography, including 14 synonyms by Desvoidy and some host records, in the Palaearctic Catalogue (vol. 3, p. 241).

ZENILLIA FRONTO Coquillett.

Exorista fronto COQUILLETT, Revis. Tachin., 1897, p. 96.

Front of male 0.309 of the head width, the sides of same gray pruinose, thickly beset with short black hairs, front rather prominent at base of antennae; face gray pruinose, the ridges weakly bristly nearly one-half way; bucca one-fifth the eye height; palpi yellow; antennae black, as long as the face, the third joint of male six times as long as the second, arista thickened on the basal two-fifths, penultimate joint short. Thorax black, gray pollinose, marked with four black vittae; four dorsocentral macrochaetae; scutellum black, with three long and one short apical pair of bristles. Sternopleura with three bristles. Abdomen black, subshining, the bases of the last three segments gray pollinose; discal macrochaetae present on the last three segments, the abdominal hairs rather long and erect. Legs black, the mid tibiae with one bristle on the outer front side near the middle; hind tibiae weakly ciliate. Wings with a light tinge of brown throughout, deeper at the base and along the costa.

Length 7mm.

Described from a single male specimen, Mount Washington, New Hampshire (Mrs. Slosson).

Type.—Male, Cat. No. 3753, U.S.N.M.

Subgenus EUSISYROPA.

ZENILLIA BLANDA Osten Sacken.

Exorista blanda OSTEN SACKEN, Canad. Ent., vol. 19, 1887, p. 162.—WILLISTON, in Scudder's Butterflies of New England, vol. 3, p. 1918, pl. 89, fig. 11.

Exorista blanda proserpina WILLISTON, in Scudders's Butterflies of New England, vol. 3, p. 1919.

Exorista hypenae COQUILLETT MS., Howard, Bull. 7, new ser., Bur. Ent., 1897, p. 47.—HAWLEY, Memoir 15, Cornell Univ. Expt. Sta., 1918, p. 196.

Eusisyropa blanda TOWNSEND, Smiths. Misc. Colls., No. 1803, 1908, p. 97.

Exorista boarmiae COQUILLETT, Revis. Tachin., 1897, p. 95.—HOWARD and FISKE, Bull. 91, Bur. Ent., 1911, p. 145.—BRIMLEY, Ent. News, vol. 33, 1922, p. 22.—GREENE, Proc. U. S. Nat. Mus., vol. 60, Art. 10, p. 11, fig. 25 (puparium).

This variable species has discal macrochaetae, and a single bristle on the outer front side of the middle tibia; it has either three or four dorsocentrals; two sternopleurals or two and a small below; femora either reddish-yellow or black; apical scutellars turned either upward or backward.

The typical form was described as *boarmiae*, new species by Coquillett in his revision; but his *blanda* also comes within the limits of variation of the species.

In this complex group one set of males are readily distinguishable, but we can not separate the corresponding females; hence we let this form stand as a subspecies. Prolonged effort has not resulted in the separation of any other forms by constant characters, however slight.

TABLE OF SUBSPECIES—MALES.

Abdomen with the pollen of the third and fourth tergites continuing on the venter; inner forceps rather thick apically, the last fifth bent at an oblique angle, the back with long hair to the bend; femora black or yellow.
blanda Osten Sacken.

Abdomen with the third and fourth tergites shining brown or black on the venter, contrasting with the pollinose second; inner forceps more slender apically, almost straight, with a minute tooth in front at apex, hairy only about two-thirds of their length; femora black---------virilis, new subspecies.

ZENILLIA BLANDA BLANDA Osten Sacken.

Front variable in both sexes, in male from 0.19 to 0.27, and in the female 0.245 to 0.32 of the head width; front, face, and posterior orbit silvery white pollinose; sides of front sparsely clothed with indistinct short hairs; the frontal bristles reach well down nearly opposite the base of third antennal joint, the two uppermost ones stout and reclinate; facial ridges bristly on the lowest fourth, bucca linear, about one-tenth the eye height; palpi nearly always yellow, sometimes slightly reddish, clothed thickly with short black hairs; probosis yellow; antennae yellowish, as long as the face, the third joint in both sexes from three and one-half to four and one-half times the second; arista gradually tapering from base to apex, penultimate joint short. Thorax black, gray pollinose, marked with four black vittae, the outer ones broken at the suture; dorsocentral macrochaetae variable, in the type specimen there are four, but in many specimens which are certainly this species there are but three, occasionally a specimen will be found with four on one side and three on the other; scutellum grayish, bearing two long and two short pairs of marginal bristles, the apical pair curving upward or backward; there is also a weak pair on disk. Sternopleura gray pollinose, clothed with fine black hairs and bearing two stout and unusually a vestigial third bristle, quite often there are but two and sometimes three quite well developed ones on one side and but two on the other. Abdomen thick, the fourth segment shorter than the third, blunt, closing in a slit behind in the female in the lower end of which the genital organs are placed; black, the first segment wholly so, the second and third gray pollinose at base their apices blackish, fourth segment slightly yellowish, sometimes grayish pollinose. First segment with marginal macrochaetae, second with marginal and a median pair of discals; third with one pair of median discals and a marginal row, the fourth with two rows, one on the apical half and the other at the extreme apex; abdominal hairs depressed. Legs yellow, femora often black, tarsi blackish, mid tibiae with one bristle on the outer front side near the middle; hind tibiae weakly ciliate, with one longer bristle near the middle. Wings hyaline, the third vein with two bristles at its base.

Length 4 to 8 mm.

Redescribed from many specimens of both sexes, including several long series that were reared. The type of *blanda*, locality not given, is in the Museum of Comparative Zoology, Cambridge, Massachusetts, and has been examined by the junior author; it is the same form as the type of *boarmiae*, which is in the National Museum (type No. 3591). The specimen referred to in literature as *Exorista hypenae* Coquillett, but never described, is in the collection, and also belongs to the typical form of *blanda*. Over 100 specimens reared from *Cacoecia cerasivorana* Fitch and *fervidana* Clemens at the gypsy moth laboratory agree in having four dorsocentrals and the apical scutellars turned up; this agreement would suggest a subspecific form, but other specimens have one or both of the characters so that it is impossible to define a group of any rank. In the series referred to, three-fourths of the specimens have two sternopleurals and a vestigal third, but the last-named one is absent on one side only in the other fourth. Fifteen specimens bred from *Cingilia catenaria* Drury at the gypsy moth laboratory show the following differences in chaetotaxy:

Six specimens have three dorsocentrals, two sternopleurals, apical scutellars turned back.

Two specimens have three dorsocentrals, two sternopleurals, apical scutellars turned up.

Four specimens have four dorsocentrals, three sternopleurals, apical scutellars turned up.

Two specimens with four dorsocentrals, three sternopleurals, apical scutellars turned back.

One specimen with three dorsocentrals on one side, four on the other, three sternopleurals, apical scutellars turned up.

The species seems hardly less abundant southward than in New England. Specimens in the collection are from New Jersey, New York, Maryland, Virginia, Kansas, Arkansas, New Mexico, Arizona, Florida, Cuba, and Peru.

The breeding records additional to those mentioned are all from Lepidoptera, as follows:

Vanessa cardui Linnaeus, no locality (type).

Isturgia truncataria Walker, bred by John B. Smith at Cotuit, Massachusetts, emerged September 12, 1883. Coquillett (Revis. p. 13), erroneously gives the host as *Boarmia pampinaria*, from which he named the supposed new species *boarmiae*. Obviously this specimen should be the type of *boarmiae*, and we have so labeled it.

Alabama argillacea Huebner, Mississippi, Townsend, (Musc. Flies, 1908, p. 99) (this specimen was erroneously labeled as type of *boarmiae*, but was not originally included).

Hypena humuli Harris, no locality, Howard (Bull. 7, n. ser., Bur. Ent., p. 47) (type of *hypenae* Coquillett MS).

Thanaos brizo Boisduval and LeConte, no locality, Williston, in Scudder's Butterflies of New England (vol. 3, 1889, p. 1918) (type of *proserpina*, n. var.).

Loxostege similalis Guenée, Camden, Arkansas, Coquillett, Revis. p. 13.

Euclea delphinii Boisduval (as *cippus* Cramer), Virginia, Coquillett, Revision, p. 13.

Acrobasis comptoniella Hulst, Center Harbor, New Hampshire, by Dyar (Coquillett MS notes).

Dichogamma redtenbacheri Lederer and *bergii* Möscher, Palm Beach, Florida, by Dyar (Coquillett MS notes).

Proteopteryx bolliana Slingerland, Monticello, Florida (Walton MS).

Plathypena scabra Fabricius, North Carolina (unpublished).

Cacoecia argyrospila Walker, Canyon City, Colorado (Walton MS).

Autographa brassicae Riley, Santiago de las Vegas, Cuba (unpublished).

ZENILLIA BLANDA VIRILIS, new subspecies.

Front of male 0.19 to 0.24 (in three) of the head-width; the nine males examined all agree in having three dorsocentrals and two sternopleurals, apical scutellars variable but not decidedly upturned. It is probable that more material will extend the range of variation in this form. Distinguished in the male by having the posterior half of the venter shining instead of pollinose, a very distinct character.

Described from nine male specimens; one from Rye, New York, bred from *Papaipema harrisii* Grote by Henry Bird; two from gypsy moth laboratory, one of them reared from *Ennomos subsignarius* Huebner; two, numbers attached and evidently bred specimens, but the data not now obtainable; one, Lawrence, Kansas (Aldrich); two, gypsy moth laboratory, Massachusetts; one, Dist. Federal Mexico (L. Conrad).

One female from Lawrence, Kansas, taken at about the same time and place as one of the males, may belong here. It has three orbitals on each side, which is probably a mere abnormality. The venter is wholly pollinose.

Type.—Male, Cat. No. 25698, U.S.N.M., from Rye, New York.

ZENILLIA BLANDITA Coquillett.

Exorista blandita Coquillett, Revis. Tachin., 1897, p. 96.

Front of male 0.21 and in the female 0.25 to 0.29 (in three) of the head width; the sides silvery pollinose, sparsely haired; frontal vitta as wide as either parafrontal, two uppermost frontals reclinate, face silvery, facial ridges bristly on the lowest fourth or third, bucca one-seventh the eye height, nearly destitude of hairs excepting those of the lower border, antennae as long as the face, the third joint in both sexes four and one-half times the second, arista a little thickened on basal third, the penultimate joint short. Thorax black, gray pollinose, marked with four black vittae and bearing four dorsocentral macrochaetae; scutellum black at base, gray pollinose, the tip yellowish, bearing three long pairs of marginal and a shorter backward turning pair of apical ones. Sternopleura with three strong bristles. Abdomen thick, the fourth segment short, and deep; abdominal color black, gray pollinose, especially so at base of segments two and three, fourth segment somewhat yellowish in some specimens, gray pollinose in most. Discal macrochaetae on the intermediate segments or at least the third, two rows on the fourth, one at the apical half, the other a weaker row at the apex; abdominal hairs depressed. Legs black, sometimes brownish, mid tibiae with one strong bristle on the outer side near the middle; hind tibiae ciliate, with one longer bristle. Third vein with four or five bristles at its base.

Length 10 to 12 mm.

Redescribed from the type and several specimens of each sex, the material from New England and Washington, D. C., the latter bred from *Sarrothripus revayanus* Scopoli (Walton MS).

Type.—Female, Cat. No. 3592, U.S.N.M., from Franconia, New Hampshire.

ZENILLIA CERATOMIAE Coquillett.

Exorista ceratomiae Coquillett, Revis. Tachin., 1897, p. 101.—Reinhard, Ent. News, vol. 82, 1921, p. 72.

Front of male 0.27 to 0.30 (in three), of female 0.33 to 0.36 (in three) of the head width; front and face silvery pollinose, the former bearing many short inconspicuous hairs; front in both sexes higher and more convex in profile than in the nearest relatives; frontal bristles reach the third antennae joint, the two uppermost ones stout and reclinate; facial ridges bristly on the lowest fourth, sometimes one-third of the way; palpi yellow with black hairs, not particularly dense; bucca one-sixth the eye height, bearing but a few fine hairs on the lower half besides the stout black bristles on the lower border; antennae nearly as long as the face, first and second joint yellowish, the third blackish, about four and one-half times the second in the male, somewhat shorter in the female; arista considerably thickened on the basal third, the penultimate joint short. Thorax black, thickly gray pollinose, marked with four black vittae, the outer ones broken at the suture; four dorsocentral macrochaetae; scutellum thickly gray pollinose with four pairs of marginal bristles; in the female the apical pair are sometimes absent, all bristles are directed backward; sternopleura gray pollinose, thickly clothed with fine hairs, and with three stout bristles. Abdomen, excepting the dorsum of the first segment, which is black, thickly gray pollinose on basal two-thirds of each segment, the apical third with thin brown pollen; thick, the fourth segment shorter than the third and somewhat wedge-shaped. Venter usually gray pollinose. No discal macrochaetae; first segment with one short median pair, sometimes vestigial, second with one pair, third with marginal row, the fourth with two rows, one uncommonly large and stout at the middle, the other much smaller at the extreme apex. Abdominal hairs depressed. Legs black; mid tibiae with one bristle on the outer front side near the middle; hind tibiae evenly ciliate with sometimes a longer bristle near the middle. Wings hyaline, the apical cell open, third vein bearing two or three bristle at its base.

Length 5.5 to 8 mm.

The type material now in the United States National Museum includes two specimens reared from *Pempelia*, species at Fort Worth, Texas; one from *Omphalocera cariosa* Lederer at Oswego, Kansas; and from a pyralid at Cadet, Missouri. Another specimen was reared from *Lagoa crispata* Packard at McMeckin, Florida; one from *Loxostege similalis* Guenée by E. G. Kelly at Waurika, Oklahoma. There are four collected specimens from Plano, Texas (Tucker); one from Columbus, Texas (Riley collection); and one from Plummer Island, Maryland (Shannon).

Coquillett reported specimens reared from *Ceratomia undulosa* Walker at St. Louis, Missouri, by Riley. Reinhard has reared the species from *Loxostege similalis* Guenée at Laredo and College Station, Texas.

Type.—Male, Cat. No. 3601, U.S.N.M., from Fort Worth, Texas.

ZENILLIA FUTILIS Osten Sacken.

Exorista futilis OSTEN SACKEN, Canad. Ent., vol. 19, 1887, p. 161.—COQUILLETT, Revis. Tachin., 1897, p. 98.—WILLISTON, in Scudder's Butterflies of New England, vol. 3, 1889, p. 1917, pl. 89, fig. 10.—TOTHILL, Canad. Ent., vol. 45, 1913, p. 71.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, 1922, p. 11, fig. (puparium).

Euexorista futilis TOWNSEND, Proc. Ent. Soc. Wash., vol. 14, 1912, p. 166.

Readily separated from all others of this group by the dark reflecting spots on the parafacials just below the frontal bristles.

Front of male 0.268–0.274–0.288 and in the female 0.285–0.307–0.333 of the head width; face and front yellowish pollinose; the former with a dark brown reflecting spot just below the lowest frontal bristles; facial ridges bristly on the lowest fourth; bucca about one-sixth the eye height; palpi black; third joint of the antennae in the male three and one-half and in the female two and one-fourth times the second, arista thickened on the basal fifth, the penultimate joint short. Thorax black, gray pollinose bearing four dorsocentral macrochaetae; scutellum black with three long and one shorter apical pair of marginal bristles; sternopleura with three bristles. Abdomen black, gray pollinose, the anal segment yellowish, destitute of discal bristles on the intermediate segments. Mid tibiae with two bristles on the outer front side near the middle; hind tibiae unevenly ciliate. Hypopygium black, gray pollinose, the inner forceps stout, slightly curved inward, shiny black, and densely clothed with long fine hairs; outer forceps about the same length, very slender and tapering to a fine point.

Length 9 to 11 mm.

Redescribed from numerous specimens: Two without locality but with printed name labels are probably from the lot mentioned by Williston; one without locality was submitted to Brauer and Bergenstamm and identified by them as *Parexorista futilis* Osten Sacken; four are from Oregon (Koebele); one without locality was bred from *Vanessa atalanta* Linnaeus (Riley collection); one from Salem, Massachusetts, was reared from *Pyrausta nubilalis* Huebner (Craig); a series at the gypsy moth laboratory were reared from *Ennomos subsignarius* Huebner; other specimens unreared are from Indiana (Aldrich), Massachusetts (Webber), New York, and Kaslo, B. C. (Currie). The type in the Museum of Comparative Zoology at Cambridge has been examined by the junior author; it has no locality, but was reared from *Vanessa atalanta* Linnaeus.

The species has been reported from New Jersey (Smith Catalogue, both editions); Ottawa, Canada (Gibson, Rept. Ent. Soc. Ont.); Connecticut (Britton, Check list). Coquillett reported it as reared from *Malacosoma thoracica* Stretch in California, and in a manuscript note he added *Malacosoma disstria* Huebner at Albany, New York, by Lintner. Tothill reared it from *Isia isabella* Smith and Abbot at Ottawa, Canada.

Townsend has called attention to the fact that this species lays microtype eggs on foliage, which are swallowed by its host.

Genus PHOROCERA Robineau-Desvoidy.

Phorocera Robineau-Desvoidy, Myodaires, 1830, p. 131. Type designted by Robineau, Dipt. Env. Paris, vol. 1, 1863, p. 509, as *Tachina assimilis* Fallén; this was not originally included, but on the same page Robineau makes his *agilis*, originally included, a synonym of *assimilis*.

Pales Robineau-Desvoidy, Myodaires, 1830, p. 154 (not Meigen, 1800, not available but still preoccupying the name). Type, *strenua* Robineau-Desvoidy, by designation of Robineau, Dipt. Env. Paris, vol. 1, 1863, p. 519 (=*Tachina processionea* Ratzeberg).

Chaetogena Rondani, Prod. Dipt. Ital., vol. 1, 1856, p. 68. Type designated, *Tachina assimilis* Fallén.

Scotia Robineau-Desvoidy, Dipt. Env. Paris, vol. 1, 1863, p. 255. Type designated, *placida* Robineau-Desvoidy (=*Tachina grandis* Zetterstedt).

Tritochaeta Brauer and Bergenstamm, Zweifl. Kais. Mus. Wien, pt. 4, 1889, p. 92; pt. 5, 1891, pp. 338, 401; pt. 6, 1893, p. 118. Type and sole species, *prosopoides*, new (=*Tachina pullata* Meigen).

Setigena Brauer and Bergenstamm, Zweif. Kais. Mus. Wien., pt. 4, 1889, p. 94, emendation of *Chaetogena* Rondani, *vox hybrida*.

Parasetigena Brauer and Bergenstamm, Zweif. Kais. Mus. Wien., pt. 5, 1891, p. 339, no species; pt. 6, 1893, p. 120, sole species, *Chaetogena segregata* Rondani.

Tetragrapha Brauer and Bergenstamm, Zweifl. Kais. Mus. Wien, pt. 5, 1891, p. 351; pt. 6, 1893, p. 124. Sole species, *tessellata*, new.

Euphorocera Townsend, Trans. Amer. Ent. Soc., vol. 19, 1892, p. 112. Sole species, *tachinomoides* Townsend.

Neopales Coquillett, Proc. U. S. Nat. Mus., vol. 37, 1910, p. 575, new name for *Pales* Robineau-Desvoidy, preoccupied.

Neophorocera Townsend, Proc. Ent. Soc. Wash., vol. 14, 1912, p. 162. Type designated, *Phorocera edwardsii* Williston (= *Phorocera claripennis* Macquart).

Patelloa Townsend, Proc. U. S. Nat. Mus., vol. 49, 1916, p. 619. Type designated, *Phorocera leucaniae* Coquillett.

Phyllophorocera Townsend, Proc. U. S. Nat. Mus., vol. 49, 1916, p. 621. Type designated, *Phorocera sternalis* Coquillett.

Euphoroceropsis Townsend, Proc. Biol. Soc. Wash., vol. 30, 1917, p. 49. Type designated, *alba* Townsend.

Neoscotia Townsend, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 579. New name for *Scotia* preoccupied.

Eutritochaeta Townsend, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 580. Type designated, *carpocapsae*, new (=*Neopales noctuiformis* Smith).

In arranging the above synonymy we have examined all the type species involved. In the European literature there may be other synonyms, but if so we have not seen the type species.

Named specimens of both sexes of *Phorocera* (*Parasetigena*) *tachinomoides* and *claripennis* were sent to the eminent European authority Dr. J. Villeneuve, with the request that he place them in their proper genus. He placed them in *Stomatomyia* Brauer and Bergenstamm. But the type species of this genus, *filipalpis* Rondani, has reduced palpi and the hind crossvein drawn in from the margin so that the last segment of the fifth vein is almost as long as the preceding, characters which we regard as generic. Townsend has placed *Stomatomyia*, along with his own *Plagiprospherysa* (which we consider a synonym of it), in the family Dexiidæ. We agree with Doctor Villeneuve, except that we make a somewhat closer generic division here. The case will serve to illustrate the unsettled state of the classification in this group.

As indicated in the table of genera, the genus is here regarded as containing four groups of subgeneric rank; these with their respective synonyms are as follows:

1. *Phorocera*.
    - *Chaetogena*.
    - *Setigena* (emendation).

2. *Parasetigena.*
    Scotia (preoccupied).
    Euphorocera.
    Tetragrapha.
    Neophorocera.
    Euphoroceropsis.
    Neoscotia.
3. *Patelloa.*
4. *Neopales.*
    Pales (preoccupied).
    Phyllophorocera.
    Tritochaeta.
    Eutritochaeta.

SPECIES TRANSFERRED TO OTHER GENERA.

Doryphorae Riley goes in *Doryphorophaga* Townsend.

Macra Van der Wulp, of Coquillett's Revision, has been described by Townsend as *Pelecotheca panamensis*, new genus and species,[8] but not from the material Coquillett had. The species lacks the acrostichals immediately before the suture, and is related to *Pseudeuantha* (*Macquartia* of Coquillett).

Parva Bigot, of Coquillett's Revision, was described by Coquillett himself afterwards as a new species, *erecta*.[9]

Rufilabris Van der Wulp, of Coquillett's Revision, has been described by Townsend as *Eupelecotheca celer*, new genus and species[10]; this genus is hardly distinct from *Pelecotheca*, erected in the same place for *macra*. In *rufilabris*, *parva*, and *macra* the identity of the original species remains uncertain.

Saundersii Williston, see *Madremyia*.

The reproductive habits of *assimilis* are unknown, but the European *caesifrons*, regarded as hardly more than a variety, deposits macrotype eggs. The American *claripennis* and *tachinomoides* have the same habit. *Leucaniae* lays microtype eggs on foliage.

TABLE OF SPECIES OF PHOROCERA.

1. Abdomen with discal macrochaetae or strong erect discal bristles on at least the third and fourth abdominal segments ---------- 20
   Abdomen without discal macrochaetae or strong discal bristles on the intermediate segments ---------- 2
2. Mid tibiae with at least two stout bristles on the outer front side near the middle ---------- 8
   Mid tibiae with but one stout bristle on the outer front side near the middle ---------- 3
3. Four dorsocentral macrochaetae ---------- 4
   Three dorsocentral macrochaetae; three sternopleural; abdomen globose ---------- **leucaniae** Coquillett.
4. With apical scutellars upturned ---------- 5
   With apical scutellars turned backward ---------- **complicata**, new species.
5. With only one recurved upper bristle in each frontal row.
   marginalis, new species.
   With two recurved upper frontals in the row ---------- 6

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[8] Insecutor Ins. Menst., vol. 6, 1918, p. 168.
[9] Proc. U. S. Nat. Mus., vol. 28, 1902, p. 112.
[10] Insecutor Ins. Menst., vol. 6, 1918, p. 169.

6. **Fourth abdominal segment with dense, deep-yellow pollen; male with ordinary hair on front and ocellar triangle** ---------- **parviteres**, new species.
Fourth abdominal segment gray or only a little yellow-pollinose; male with dense erect hair on parafrontals and ocellar triangle ---------- 7

7. Scutellum reddish except base; fourth abdominal segment with gray pollen ---------- **halisidotae**, new species.
Scutellum at most with slight indications of red at tip; fourth abdominal segment with yellowish pollen ---------- **flavicauda** Van der Wulp.

8. Abdominal hairs depressed (or if erect very short) ---------- 12
Abdominal hairs erect; facial ridges bristly slightly over one-half way; third antennal joint long and unusually wide to the apex ---------- 9
Abdominal hairs erect on the second segment, depressed on the third; third antennal joint of normal shape; abdomen mostly shining black. **subnitens**, new species.

9. With two sternopleurals ---------- **tortricis** Coquillett.
With three or four sternopleurals ---------- 10

10. Bend of fourth vein rectangular, apical cell almost closed in the margin; third vein with six hairs at base ---------- **hamata**, new species.
Bend of fourth vein obtuse and broadly rounded; apical cell more widely open; third vein with two or three hairs at base (if with four sternopleurals see *Zenillia lobeliae* Coquillett) ---------- 11

11. Antennae black, abdomen of usual form ---------- **noctuiformis** Smith.
Antennae broadly reddish, abdomen thick at apex in profile. **pachypyga**, new species.

12. Hind tibiae unevenly ciliate on the outer side, with several longer bristles; bucca one-fifth the eye height; bend of fourth vein generally with a distinct fold ---------- 13
Hind tibiae evenly ciliated, with at most one longer bristle; bucca one-fourth the eye height; face conspicuously receding; frontal bristles overlapping those of the facial ridges; front pulvilli in male about equal to the last three tarsal segments; third vein with only 3 hairs at base ---------- **imitator**, new species.

13. Third antennal joint very long and very wide to the apex in both sexes ---------- 14[a]
Third antennal joint usually of moderate length, if long then it is not uncommonly wide ---------- 16

14. Usually two sternopleurals; inner forceps of the male united into a small central organ, slender at the tip, its basal part provided with a dense brush of hairs behind, which curve downward ---------- **cinaris** Smith.
Three sternopleurals; male forceps without brush ---------- 15

15. Abdomen of male strikingly elongated; inner forceps united into a slender and curved beak, its base suddenly widening into a portion which is deeply grooved behind, the groove full of dense, soft, pale hairs ---------- **coccyx**, new species.
Abdomen of male not elongated; inner forceps united into a rather straight beak, which is deeply grooved behind on the apical half; and turned forward at the tip ---------- **sulcata**, new species.

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[a] *Alba* would run to this number. It is known only from a damaged female which has unusually dense, white pollen, and an elongated abdomen. See description. Locality, Tampico, Mexico. (Townsend, Proc. Biol. Soc. Wash., vol. 30, 1917, p. 50.)

16. Abdomen with second to fourth segments shining on the posterior third or more ---- 17

Abdomen with second to fourth segments pollinose or subpollinose to the hind edge; males with a tuft of dense long hair before the middle coxae ---- 18

17. Basal joints of antennae reddish; venter pollinose in part; male with only the usual hair before the middle coxae ---- **claripennis** Macquart.

Whole antennae black, slender and elongate; venter shining black (male unknown) ---- **indivisa**, new species.

18. Palpi black on basal half; abdomen broadly red on sides of first, second and third segments, leaving only a median stripe black; the united inner forceps form a slender curved process, flat behind at middle, keeled basally and slightly hooked at tip. **tessellata** Brauer and Bergenstamm.

Palpi yellow ---- 19

19. Parafrontals golden yellow; male genitalia small; base of the united inner forceps flat behind ---- **floridensis** Townsend.

Parafrontals white or pale yellow; large species with large genitalia, the base of the united inner forceps round, keeled behind. **tachinomoides** Townsend.

20. Sides of the face below the lowest frontals bare or with a few hairs directed upward ---- 23

Sides of the face below the lowest frontals with a few hairs directed downward and extending as far as the middle of the third antennal joint ---- 21

21. Abdominal hairs not bristly in median region although somewhat erect; small crossvein not infuscated ---- 22

Abdominal hairs erect, long and bristly, apical cell open; bucca one-third the eye height; small crossvein infuscated ---- **specularis**, new species.

22. Apical cell closed; bucca one-half the eye height ---- **facialis** Coquillett.

Apical cell open; bucca one-fourth the eye height ---- **meracanthae** Greene.

23. Palpi yellow ---- 27

Palpi black (in *tortricis* the apical half or less is sometimes yellow) ---- 24

24. Mid tibiae with one bristle on the outer front side near the middle; arista thickened on the basal third ---- 25

Mid tibiae with two bristles on the outer front side near the middle, the upper one a little smaller; two or three sternopleural bristles; arista slender, hardly thickened basally ---- **tortricis** Coquillett.

Mid tibiae with at least two stout bristles on the outer front side near the middle; four sternopleural bristles; arista thickened to the middle; third antennal joint in the male unusually thickened and convex on the outer edge ---- **sternalis** Coquillett.

25. With four sternopleural bristles; abdominal hairs depressed; thorax and abdomen gray pollinose ---- **erecta** Coquillett.

With three sternopleural bristles ---- 26

26. Mesonotum gray pollinose, with the usual stripes; abdomen gray pollinose on the first three segments, yellow on the fourth. **xanthura**, new species.

Mesonotum and abdomen shining black ---- **unipilum**, new species.

27. Mid tibiae with one bristle on the outer front side near the middle ---- 33

Mid tibiae with at least two stout bristles on the outer front side near the middle ---- 28

28. Sides of front outside of the front bristles bearing many long hairs ---- 30

Sides of front outside of the frontal bristles bearing only short hairs ---- 29

29. Parafacial at narrowest wider than the rather narrow third antennal joint (compare **reinhardi**, new species) ---------- **silvatica**, new species.
Parafacial at narrowest about equal to the decidedly widened third antennal joint ---------- **slossonae** Townsend.
Parafacial at narrowest only half the width of the third antennal joint, which is of ordinary form ---------- **tenuiseta**, new species.
30. Parafacial at narrowest wider than third antennal joint ---------- 31
Parafacial at narrowest narrower than third antennal joint ---------- 32
31. Front unusually broad, the vertex of the male 0.38, of the female 0.37 to 0.48 of the head width ---------- **setifrons**, new species.
Front of ordinary width, vertex of male 0.22, of female 0.34 the head width; third antennal joint broadly red at base ---------- **silvatica**, new species.
32. Male with dense and striking brush of long black hairs on base of inner forceps ---------- **pluriseriata**, new species.
Male with only a few scattering long hairs on base of inner forceps.
fusicimacula, new species.
33. Three posterior dorsocentral bristles ---------- 38
Four posterior dorsocentral bristles ---------- 34
34. Sides of front with numerous bristles outside the frontal row; first and second and at least the base of the third antennal joint reddish ---------- 37
Sides of front outside the frontals without bristles ---------- 35
35. Fourth abdominal segment densely deep yellow pollinose, contrasting strongly with the two preceding segments ---------- **signata**, new species.
Fourth abdominal segment with pollen of same color as on preceding segments ---------- 36
36. Intermediate abdominal segments each with two pairs of discal macrochaetae ---------- **incrassata** Smith.
Intermediate abdominal segments each with but a single pair of discal macrochaetae ---------- **festinans**, new species.
37. Abdomen black, the last three segments gray pollinose on the basal three-quarters, in striking contrast to the black apices, with a definite line of demarcation ---------- **comstocki** Williston.
Abdomen black, thickly covered with gray pollen, with no distinct pattern; anal segment wholly gray pollinose ---------- **texana**, new species.
38. Three sternopleural bristles ---------- 39
Two sternopleural bristles ---------- **levis**, new species
39. Sides of front outside the frontal bristles destitute of long hairs; anal segment yellowish pollinose; mid tibiae with one long bristle on the outer front side near the middle ---------- **leucaniae** Coquillett
Sides of front outside of the frontal bristles bearing long hairs.
fulviceps Van der Wulp.

Subgenus PHOROCERA.

PHOROCERA SLOSSONAE Townsend.

?*Phorocera cinerea* VAN DER WULP, Biologia, Dipt., vol. 2, 1890, p. 81.
Euphorocera cinerea COQUILLETT, Bull. 7, Tech. ser., Div. Ent., 1897, p. 102.
Phorocera slossonae TOWNSEND, Smiths. Misc. Colls., vol. 51, No. 1803, 1908, p. 108, new name, for Coquillett's specimen, believed misidentified.

Male.—Front rather wide, light gray pollinose, the frontal stripe broad, the single row of bristles diverging below and extending as far as the arista; ocellar bristles normal, parafacials rather wide, the facial ridges with bristles almost to the level of the frontals;

antennae black, the third joint three times the second; arista thickened on basal half, its penultimate joint twice as long as wide; palpi rather long and slender, yellow; probocis short; bucca (below the eye) more than one-third of the eye height.

Thorax black with gray pollen forming the usual changeable stripes. Posterior dorsocentral bristles 3 with sometimes a small fourth one; sternopleurals 3; scutellum with 3 lateral bristles the apical pair very slender, hair-like.

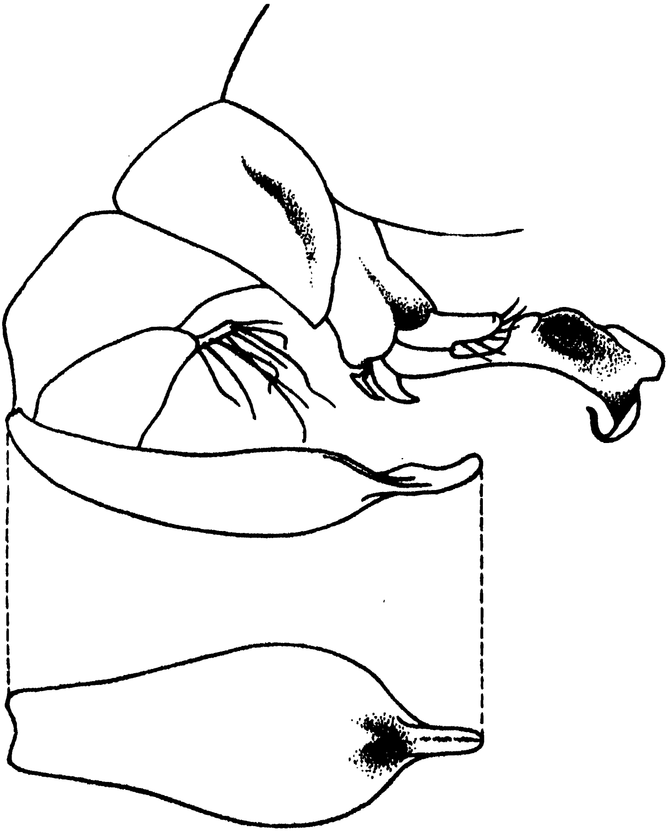

FIG. 1.—PHOROCERA SLOSSONAE TOWNSEND, MALE GENITALIA, MUCH ENLARGED. (DRAWN BY CHAS. T. GREENE.)

Abdomen with dense gray pollen forming a changeable pattern, the hind margins of the segments more or less shining; discal macrochaetae on the second, third, and fourth segments; a large marginal pair on the first segment; genital segments black [genitalia, fig. 1], the inner forceps united to form a boat-shaped structure with a decided keel behind and suddenly narrowing apically into a slightly curved beak; the outer forceps broad and shining, closely appressed to the under surface of the second genital segment, and tapering rapidly to a hairy slender tip; fifth sternite with a deep narrow cleft, the two plates rather large and prominent without any striking hairs or bristles.

Legs black, middle tibia with three bristles on the front side; the claws and pulvilli elongated, especially on the front feet.

Wings hyaline, costa without spines, third vein with two or three hairs at base.

Female.—Front somewhat wider, claws and pulvilli short. Wing wider in proportion. Fourth segment of abdomen with numerous bristles on the sides and below. The abdomen is provided with a short, flat, curved piercer lying between two rather large and prominent plates.

Length 8 mm.

Described from four specimens: one male (figured), "Maryland, near Plummer Island" (W. L. McAtee); one male and one female on same pin, West Hills, Long Island (W. T. Davis); one female, Franconia, New Hampshire (Mrs. A. T. Slossen), type of *Euphorocera slossonae*.

Type.—Female, Cat. No. 10912, U.S.N.M.

A male of *Phorocera assimilis* Fallén, the type species of the genus, is in the United States National Museum, determined many years ago by Brauer and Bergenstamm. The very striking male genitalia agree remarkably with those of our males, and it seemed for some time that the species were the same. Further examination led to the conclusion that the American form has a more shining abdomen and much longer hair on the sides of the united inner forceps. There can be no question that they belong to the same genus in the narrowest possible conception of the term.

The only known species in North America with closely similar genitalia is *Pseudotachinomyia webberi* Smith, which has bare eyes.

Subgenus PARASETIGENA.

Since the males of this group admit of much more satisfactory analysis than the rest of our material, it is believed that a supplementary table of them will greatly assist other workers. The genitalic and other characters used here are quite striking in life, but difficult to figure. The subgenus is primarily distinguished by the union of the inner forceps into a single more or less beak-like organ and the reduction of the outer forceps to a plate-like form, broad and rounded, somewhat like the form which they have in Sarcophaga. Most of the species have the abdomen elongate in the male, or even in both sexes; some have a fold at the bend of the fourth vein which at a certain angle looks like a continuation of the vein; in most species the third vein is bristly halfway to the crossvein; none have discal abdominal bristles; all have four dorsocentrals.

The following table contains three species—*virilis*, *cocciphila* and *divisa*—which are not included in the preceding general table of *Phorocera*, they having been obtained after it was completed.

TABLE OF SPECIES. MALES.

1. Pollen of abdomen confined to dorsal surface except anteriorly, the third and fourth tergites shining below and showing a sharp line of division at the side: bristles of mid coxae and region just anterior very numerous, forming a dense recurved bunch ---------- 2

Pollen of the dorsum of third and fourth abdominal segments continuing toward the middle line below without a sharp break at the side: mid coxae and adjacent region without unusual number of bristles ---------- 4

2. Palpi strongly infuscated at base, second antennal joint black. **tessellata** Brauer and Bergenstamm.

Palpi yellow at base, second antennal joint reddish-yellow ---------- 3

3. Pollen of front and face golden, pollen of fourth abdominal segment covering much more than half its upper surface ---------- **floridensis** Townsend.

Pollen of front and face white, pollen of fourth abdominal segment covering less than half ---------- **tachinomoides** Townsend.

4. With a distinct fold at bend of fourth vein ---------- 5

Without fold at bend of fourth vein ---------- 9

5. Pollen on basal portion of third segment undivided ---------- 6

Pollen on basal portion of third segment divided by a median black stripe ---------- 7

6. Antennae wholly black; palpi dark at base; abdomen with narrow silvery bands at base of segments 2, 3, and 4, the remainder of the segments subshining (female only known) ---------- **indivisa**, new species.

Antennae with second segment red; palpi wholly yellow; abdominal segments 2, 3, and 4 with anterior half pollinose ---------- **claripennis** Macquart.

7. The frontal bristles weak; the two upper reclinate much smaller than the arista; the united inner forceps flat and broad at base, suddenly narrowed into a slender beak ---------- **hamata**, new species.

The frontals large and strong; the united inner forceps tapering uniformly into a rather long nearly straight process ---------- 8

8. Second abdominal segment with long erect bristly hairs along the median region; small slender species ---------- **subnitens**, new species.

Second abdominal segment with hairs barely longer than on the third segment; robust tropical species ---------- **divisa**, new species.

9. Sternopleurals 2 ---------- 10

Sternopleurals 3 ---------- 12

10. The united inner forceps bearing a dense tuft of crinkly hairs bent forward ---------- 11

The united inner forceps with only a fringe of minute brownish hairs around a central shining, bare plate ---------- **complicata**, new species.

11. The tuft on the united inner forceps begins at the extreme base. **cocciphila**, new species.

The tuft on the united inner forceps begins considerably beyond the extreme base; beak very small ---------- **einaris** Smith.

12. The united inner forceps provided with dense, even, erect, short hair on the back to the very tip, which is blunted and bent back.
imitator, new species.
The united inner forceps short and bent forward at tip........ 13
13. The united inner forceps forming a curved tip like a cuckoo's beak, the base with a ridge on each side and a dense mass of short yellow hair in the inclosed groove........**coccyx**, new species.
The united inner forceps not with such structure........ 14
14. The united inner forceps straight almost to the tip, deeply grooved behind near the tip........**sulcata**, new species.
The united inner forceps strongly curved forward from about the middle........**virilis**, new species.

Alba Townsend is known only from the female and can be traced only to couplet 12 in this table. *Indivisa*, although the male is not known, appears to run satisfactorily to its place in couplet 6.

PHOROCERA VIRILIS, new species.

Male.—Front 0.29 of the headwidth; pollen of head rather uniform pale golden-yellow; frontal bristles about 10 in number, the two uppermost moderately strong and reclinate, those below much smaller except the lower ones, the row extending slightly below the arista; parafrontals rather densely covered with short, black hairs; antennae black, the third joint hardly four times the second, rather wide at apex; the arista slender, much longer than the third joint, its penultimate joint distinct but short; facial ridges with stout bristles reaching to the level of the arista; parafacials at narrowest about one-half the width of the third antennal joint; palpi yellow on the apical half, blackish basally; proboscis small; bucca about one-sixth the eye-height; back of head with dense whitish beard. Thorax yellowish cinereous, the four usual dorsal stripes narrow, when viewed from behind, and a median one somewhat distinct which reaches to the scutellum; posterior dorsocentrals 4; anterior dorsocentrals 3; sternopleurals 3; scutellum with three lateral pairs of bristles and an apical decussate pair, about as large as the middle lateral; also with a distinct pair of discals of about the same size. Abdomen with yellowish pollen on the basal part of segments two, three, and four, which extends underneath but changes to white in that region; the first and second segments with only a small pair of median marginals on each, the third with a very stout row; when viewed from behind, there is a median, dark stripe which is fusiform on the second segment, very narrow on the third and wide on the fourth, where it blends with the apical, shining half; the second and third segments have about the posterior half shining but vary in different angles of view. Genitalia small, brownish-black; the united inner forceps narrowing to a beak, which is strongly curved forward; the outer forceps flat, broadly rounded toward the apex, where they are as wide as near the base, considerably shorter than the beak. Legs black; outer side of front femur cinereous, the front tibia longer than the front tarsus to the base of the claws (in the proportion of 47 to 41); all the pulvilli very long, the front ones as long as the last three tarsal joints; middle tibia with two bristles on the outer front side, but the upper one quite small, only half the lower; middle coxae and the space just anterior with only a few bristles. Wing hyaline; fourth vein without perceptible fold at the bend; third vein with six to eight bristles.

Length 12 mm.

Described from one male, Washington, D. C., August 15, 1923 (Aldrich), taken on honey dew on the tulip tree.

Type.—Male, Cat. No. 26781, U.S.N.M.

PHOROCERA COCCIPHILA, new species.

Male.—Front 0.28 of the head width (average of five: 0.26, 0.26, 0.28, 0.28, 0.30), pale yellow, the parafacials with silvery pollen; frontal bristles about ten, the two uppermost strong and reclinate, the remainder smaller, except one striking pair at the level of the antennal insertion; the lowest frontal bristles a little below the arista. Antennæ black, third joint moderately broad, about three and one-half times the second; arista slender to the base and rather long, its penultimate joint distinct, from one to two times as long as thick; bucca about one-sixth the eye height; palpi yellow on apical half or more, the base blackish; proboscis short; back of head with dense, pale beard, more yellowish above. Thorax yellowish, cinereous, with rather narrow, dark stripes when viewed from behind, the median one very indistinct; posterior dorsocentrals 4; anterior dorsocentrals 3; sternopleurals 2 (in all the six specimens). Scutellum with three pairs of marginals, a pair of apicals which are about three-fourths as long as the adjacent marginals, and a pair of smaller discals. Abdomen with yellowish, cinereous pollen becoming whiter below, the first segment with a pair of rather strong median marginals, wholly black in color except on the ventral side where there is a long, triangular spot of pollen; second and third segments with rather narrow, shining black border, the second with a single pair of large, spine-like marginals, the third with a row still larger; fourth segment with the basal yellowish pollen broadly but vaguely divided in the middle by the shining black color which covers the whole apex, the pollen of the third segment is entirely unmarked by a median, darker stripe; that of the second segment has a faint trace on the anterior half; the fifth sternite stands out quite prominently, the two side pieces erect and parallel, each with a protuberance projecting toward the middle line where they meet. Genitalia small, brown, the inner forceps having a roundish, rather flat base, covered with erect, crinkly hair bent considerably forward, and terminating in a narrow, slender, small beak; the outer forceps are reduced to small plates but rather noticeable, the front edge of each is developed into two small, hairy prolongations; the penis is thick and strongly chitinized. Legs black; front femora cinereous on outer side, the front tibia of the same length as its tarsus to the base of the claws, although to the naked eye the tarsus looks slightly longer; all the pulvilli much elongated, the front ones most as long as the last three tarsal joints. Wings hyaline, but somewhat infuscated along the veins anteriorly; fourth vein without perceptible fold at the bend; third vein with six or eight hairs at base.

Length from 11.5 to 12.1 mm.

Female.—Width of front 0.30 of the head width, almost the same as in the male, but widening more uniformly from the vertex; pollen of front yellow, except along the orbit where it is white, which color continues down around the eye below; the third antennal joint decidedly wide toward the apex, twice the width of parafacials; palpi but little infuscated at base; pulvilli and claws small.

Length 10.2 mm.

Described from five males and one female, Washington, D. C., August 15, 1923, on honeydew secreted by large scale insects on tulip tree (Aldrich).

Type.—Male; allotype, female, Cat. No. 26782, U.S.N.M.

PHOROCERA DIVISA, new species.

Male.—Front 0.29 of the headwidth by micrometer at the narrowest point; front at parafacials with white but hardly silvery pollen; frontal bristles about nine in the row, the two uppermost strong and reclinate, a slight break between them and the remainder, the lowest extending considerably below the arista. Antennae black, the third joint about four times the second, not perceptibly widened, slightly concave on the front side; arista only a little longer than the third antennal joint, decidedly thickened on the basal half, its penultimate joint small; facial ridges with strong bristles overlapping the frontals; parafacials at narrowest fully as wide as third antennal joint; palpi yellow, slightly infuscated at base; proboscis short and small; bucca about one-fifth the eye-height; back of head with bushy, white hair. Thorax cinereous, with the usual four black stripes, when viewed from behind; posterior dorsocentrals 4; anterior dorsocentrals 3; sternopleurals 3; the sternopleura just before the middle coxae with somewhat bushy, long bristles irregularly placed in several rows, but not so stout as in *floridensis*, *cubensis*, and *tachinomoides*. Scutellum uniformly pollinose, the disk covered with short, stubby, suberect hairs, among which there are no bristles; there are three marginal bristles and a small apical pair, the last about half as long as the adjacent marginal. Abdomen with white pollen which covers more than half of the second and third segments above; on the fourth segment it is very dense on the basal two-fifths but stops suddenly at the side, the remainder of the segment above, and the whole of it below, shining black; second and third segments without a trace of discal bristles, bearing a distinct median stripe of black, narrower on the third; the hair of the second and third segments, when viewed in profile, is depressed; first abdominal segment with a distinct pair of median marginals. Genitalia black, rather small, the united inner forceps gradually narrowed into a sharp beak which is a very little curved; these forceps form a somewhat boat-like structure, convex below, both transversely and longitudinally and bearing numerous small, erect, brown hairs. Legs black; the front femora cinereous on the outer side; all the tarsi shorter than their tibiae (front tibia and tarsus in the proportion of 46 to 36, measuring to the base of the claws); front pulvilli longer than the last joint of the tarsus. Wings hyaline, rather narrow; fourth vein with a distinct fold at the bend; third vein with four or five hairs at base.

Length 11.2 mm.

Described from one male, Mayaguez, Porto Rico, June 20, 1914, R. H. Zwalenburg, collector.

Type.—Male, Cat. No. 26783, U. S. N. M.

PHOROCERA TACHINOMOIDES Townsend.

Euphorocera tachinomoides TOWNSEND, Trans. Amer. Ent. Soc., vol. 19, 1892, p. 112.

Tricholyga, species, and *Euphorocera*, species, TOWNSEND, Annals Ent. Soc. Amer., vol. 4, 1911, pp. 131 and 328 (internal organs).

Euphorocera peruviana and *minor* TOWNSEND, Proc. Ent. Soc. Wash., vol. 13, 1911, p. 53, without description; Proc. U. S. Nat. Mus., vol. 43, 1912, p. 303.

Male.—(paratype of *peruviana.*) Front 0.26 of head width (two specimens, 0.25 and 0.27) pollen light yellow, still paler and approximating silver on the parafacials; orbitals distinct, the frontal rows of bristles meeting the stout bristles of the facial ridges; first two joints of antennae reddish brown, the third black; palpi yellow, slender; bucca one-fifth the eye height. Thorax densely gray pollinose; when viewed from behind there are four darker stripes, the inner ones stopping far before the scutellum; pleurae heavily pollinose, with a small pteropleural bristle; usually three sternopleurals, but sometimes two; four posterior dorsocentrals; just in front of the middle coxae at the median line are two continuous tufts of very striking long bristles which lie very close together and are curved backward. Abdomen strikingly elongate with reddish sides; the gray pollen dense on the basal portion of the segments, divided by a rather distinct narrow median line on the second and third segments and partially divided on each side of this by a prolongation forward of the more shining posterior margin; fourth segment with dense pollen which is merely notched a little behind in the middle: first and second segments each with a single smallish pair of marginals; third segment with a row of eight; fourth segment with two discal bristles back of the middle and a marginal row which passes into a cluster below on each side of the genitalia; the two genital segments are reddish-brown without distinct bristles; the inner forceps are united into a somewhat conical, long, black, hook-like organ distinctly hairy on the sides and behind, resembling the one found in *Tachinomyia robusta.* The outer forceps are modified into flat yellowish plates with rounded hairy, blackish tips. The fifth sternite is deeply cleft, but bears only a few small hairs on the outer side of the lobes. Legs black, the middle tibiae with two or more long bristles on the front side; all the claws and pulvilli much elongated. Wings subhyaline, narrow at tip; hind cross-vein oblique; bend of fourth vein rectangular and with a very distinct fold but not a continuation of a vein; first posterior cell ending far before the apex. Third vein with several bristles at the base, extending about half way to the small cross vein.

Female.—Width of front 0.34 of head width (two specimens 0.35 and 0.325). Abdomen with hardly any trace of a median stripe, the hind edges of segments 2, 3, and 4, shining black. The fourth segment with numerous spiny bristles especially below.

Length of male, 6 to 13 mm.; of female, 5 to 9.5 mm. Both sexes normally approximate the maximum of these figures, the smaller specimens having been reared in cages with insufficient food.

Type.—Male, from Las Cruces, New Mexico, deposited in the University of Kansas; examined by the senior author.

Other material examined: Type (Cat. No. 15141) and 7 other specimens of *peruviana*, from Peru (Townsend); type (Cat. No. 15142) and 2 other females of *minor*, from Peru (Townsend); more than 50 specimens from Tempe, Ariz., reared from *Malacosoma americanum* Fabricius, many dwarfed (Caffrey); 3 from Texas. collector unknown; 1 Rio Urique, Chihuahua, Mexico (Townsend).

In its more northern distribution this species overlaps *claripennis*, from which it is readily distinguished in the male by the tufts of bristles in front of the middle coxae. This character occurs in a series of southern forms, however, and reference to the male genitalia is necessary to separate these readily. The elongation of the abdomen in the male, also occurring in several species, is best developed in the largest specimens, and becomes practically imperceptible in the small ones.

PHOROCERA COMPLICATA, ne

Male.—Front 0.27 of the head width; rather dark gray above, becoming lighter anteriorly, the parafacial grayish white, the uppermost two frontal bristles very strong and directed backward; in front of these a considerable break with only one small pair, the lowest frontals just meet the large bristles which ascend the facial ridges. Antennae long, the third joint a little wider than usual, four times the second; the arista long and thin, a little thickened on the basal third; bucca one-sixth the eye height; palpi yellow; proboscis very small. Thorax gray pollinose, the dorsum slightly stained in the specimen so that the stripes, if present, are not visible; four dorsocentrals; two sternopleurals; one small pteropleural; the mesopleura has along the hind edge uncommonly dense black hair, especially above and there are four very stout bristles before the suture; the sternopleurae before the middle coxae have only a few ordinary bristles. Abdomen not elongate, black with some reddish reflections along the sides; the basal half or more of the last three segments thinly gray pollinose, the pollen gradually fading out posteriorly; first and second abdominal segments with one pair of medium marginals, the third segment with about a dozen marginals; the hind segment on its apical half with numerous erect spines; the median bristles of the second and third segments are subdepressed, but as is often the case, a few near the median line on the second segment are erect. Genital segments minute, brownish black, the inner forceps united to form a very curious and unique organ; its basal part is in the form of two large plates joining at an angle on the median line like a roof and ending with a slight notch which is fringed with dense upright yellowish hairs near the median line, changing to black hairs of a simpler character which follow along the outer margin; inside the end of the structure thus far described there is a concave, shining, brown surface, fringed behind by the yellow hairs just mentioned; at the front edge this surface is drawn out into a very minute, slender, shining beak. The outer forceps are developed into shining yellowish-red plates with long hairs at the front edge; fifth sternite deeply cleft, the lobes not very distinctly visible.

Legs black, the middle tibia with a single bristle on the outer side, the hind tibia with a rather even row of coarse cilia interrupted by one larger about the middle; on the inner hind side the hind tibia just below the middle has an uncommonly long spiny bristle which if bent down would reach the apex.

Wing subhyaline, narrow apically; the fourth vein slightly curved backward so that the bend is nearer the hind margin than usual; it is rectangular but rounded and the first posterior cell is widely open before the apex; third vein with five or six hairs at the base reaching almost half-way to the small cross-vein.

Length 10 mm.

Described from four male specimens: one from Higuito, San Mateo, Costa Rica (Pablo Schild); three Alajuelo, Panama, April 7, 1911 (August Busck).

Type.—Male, Cat. No. 25707, U.S.N.M., from Higuito.

PHOROCERA CLARIPENNIS Macquart.

Phorocera claripennis MACQUART, Dipt. Exot., Suppl., vol. 3, 1849, p. 209.

Eurygaster septentrionalis WALKER, in Lord's Naturalist in Vancouver Island, vol. 2, 1866, p. 339.

Phorocera edwardsii WILLISTON, in Scudder's Butterflies of New England, vol. 3, 1889, p. 1921.

Phorocera lophyri TOWNSEND, Trans. Amer. Ent. Soc., vol. 19, 1892, p. 112.

Euphorocera claripennis COQUILLETT, Tech. Bull. No. 7, Div. of Ent., 1897, p. 102.—HOWARD, Ins. Book, 1902, p. 88, fig.

Exorista petiolata COQUILLETT, Tech. Bull. No. 7, Div. of Ent., 1897, p. 98.

Podotachina vibrissata BRAUER and BERGENSTAMM, Zweifl. Kaiserl. Mus. Wien, pt. 5, 1891, p. 351.

Neophorocera edwardsii TOWNSEND, Proc. Ent. Soc. Wash., vol. 14, 1912, p. 163.

Male.—Front of male 0.30 of headwidth (average of four, 0.30, 0.30, 0.30, 0.29), usually silvery but often yellowish near vertex; face silvery, the sides at narrowest part as wide as third antennal joint; facial ridges bristly nearly to the base of antennae; bucca one-fifth the eye height; palpi yellow, very slender, bearing many fine long black hairs; antennae black, often somewhat yellow basally, as long as the face, the third joint five times the second; arista thickened on the basal three-sevenths, penultimate joint short. Thorax black, gray pollinose marked with four black vittae, sometimes there are five vitae posterior of the suture; four dorsocentral macrochaetae; scutellum grayish, often yellowish, bearing three pairs of long and a shorter apical pair of marginal bristles; disk usually bare. Sternopleura with three bristles. Abdomen normal, first segment black, the remaining segments shining black except the wide basal margins, which are gray; sides of the second and the apex of the fourth segment sometimes brownish. No discal macrochaetae on the intermediate segments; marginal macrochaetae on the first three, the fourth with two or three rows on the apical half to three-quarters; bristly hairs of the abdomen usually depressed; rarely erect. Legs black, mid tibiae with two or more (usually three) bristles on the outer front side near the middle; hind tibiae subciliate at most. Wings hyaline, the fourth vein usually with an appendage or distinct fold at its bend, third vein with four to six bristles at its base. Genital segments black; the united inner forceps broad at base, suddenly narrowing to a slender curved tip and with fine black hair behind, but not in tufts; outer forceps short, scarcely half as long as the inner ones, in the form of broad, shining plates, which end in a rounded, blunt point.

Female.—Front 0.36 the headwidth (average of four, 0.35, 0.35, 0.35, 0.38); third antennal joint three times the second. The shining black apical half of each abdominal segment, contrasting with the forceps short, scarcely half as long as the inner ones, in the form of the second and third segments of the abdomen, are quite characteristic.

Length of male, 4.5 to 9 mm.; of female, slightly less.

Redescribed from a long series of both sexes from all parts of the United States, from Chihuahua, Mexico; others have reported it in Canada from Vancouver Island to Ottawa and Eastern Canada.

One male from Old Crow, Alaska-Yukon boundary, above the Arctic Circle (J. M. Jessup, 1912).

The type male of *Podotachina vibrissata* Brauer and Bergenstamm was examined by the senior author, December, 1923.

Next to *Winthemia quadripustulata* Fabricius, this is probably the most abundant Tachinid encountered in economic entomology. The rearing records even in 1897 made a long list in Coquillett's Revision, but that was only a beginning; at the present time with the data in the United States National Museum and in some branches of the Bureau of Entomology it would not be difficult to list 100 rearings, on at least 40 or 50 hosts. As a complete list of Tachinid rearing records is likely to be published in the future we omit these to save space. It usually attacks Lepidoptera, but occasionally sawfly and beetle larvae.

PHOROCERA EINARIS Smith.

Phorocera einaris SMITH, Proc. Ent. Soc. Wash., vol. 14, 1912, p. 119.

Neopales einaris BRITTON, Check-List of Insects of Connecticut, 1920, p. 193 (occurrence in Connecticut).

Phorocera einaris BRIMLEY, Ent. News, vol. 33, 1922, p. 25 (occurrence in North Carolina).

Front of male 0.290—0.266 and in the female 0.316, 0.307, 0.313 the head width, yellowish gray pollinose, front in male projecting about two-thirds, in the female about one-half the eye width when viewed from the side; three uppermost frontal bristles stout and reclinate; facial ridges bristly two-thirds of the way, sometimes slightly more; sides of face gray pruinose, about one-fifth the width of the median depression; bucca one-fifth the eye height; palpi yellow; antennae black, as long as the face, the third joint in both sexes five times the length of second, arista thickened on basal fourth, the penultimate joint short. Thorax gray pollinose bearing four dorsocentral macrochaetae; scutellum gray pollinose bearing four long pairs of marginal bristles, the disk also bears a strong pair of bristles. Sternopleura usually with two bristles, sometimes with three. Abdomen destitute of discal bristles, first and second segments with marginal, the third with a row, the fourth with two rows and many shorter bristles on the apical two-thirds; abdominal hairs depressed; first segment black, second and third black at base, the apices gray pollinose, fourth segment shining black except at sides. Legs black, mid tibiae with two bristles on the outside near the middle; hind tibiae sub-ciliate. Wings hyaline, apical cell open, bend of fourth vein with indistinct fold, third vein with four or five bristles at its base. Hypopygium at times quite conspicuous, inner forceps fused together, thickened for about four-fifths their length and then tapering abruptly to a fine hook-like point; on the outer side of the thickened portion of the forceps there is a conspicuous tuft of fine hairs; outer forceps aborted.

Length 10 to 12 mm.

Redescribed from the type series of nine males and females from Melrose Highlands, Mass., Plummer Island, Maryland, and Tampico, Mexico; also from thirteen additional specimens of both sexes, from Pennsylvania, Maryland, Virginia, Florida, South Carolina, and Costa Rica. It will probably be very difficult to separate females of *imitator* and *coccyx* from this.

Type.—Male, Cat. No. 14697, U.S.N.M., from Melrose Highlands.

PHOROCERA FLORIDENSIS, Townsend.

Euphorocera floridensis TOWNSEND, Ent. News, vol. 27, 1916, p. 217.

Male.—"Differs from *E. tachinomoides* as follows: Parafrontals and parafacials deep golden, also orbits; abdomen without any red on sides, the posterior black of the intermediate segments produced forward in a triangle on each side to near front margin, heavy on second segment, these forming with the median vitta a black trident on each segment. Length, 11.5 mm.; of wing, 8 mm." (Townsend). Front 0.24 to 0.27 of the head width, third antennal joint two and one-half times the second; thorax with four black vittae not interrupted at the suture; a very distinct tuft of long bristles before the middle coxae, curving backward; abdomen elongate, without discals, fourth segment red or black at apex, with two rows of bristles, one on the apical half, the other at tip. Hypopygium rather small, the united inner forceps much as in *claripennis*, but not so suddenly narrowed into the apical process, more gradually tapering; outer forceps forming flat plates as in related species.

Female.—Front 0.34 of head width. Abdominal pattern as in the male, which readily separates it from *claripennis*, in which the pattern is in transverse bands. The same character separates it almost as well from *tachinomoides*, in which, however, there is a trace of the "tridents" of Townsend's description.

Redescribed from the type and eight other males, and one female. The type is from Gainesville, Florida, reared from *Anticarsia gemmatilis* Huebner by J. R. Watson; two males and the female were reared at New Bern, North Carolina, from *Plathypena scabra* Fabricius (Chittenden No. 6067); one male from Bentonville, Arkansas, bred from *Saperda*, species (Quaintance No. 16398) by A. J. Ackerman; one male from Columbia, South Carolina, reared from *Laphygma frugiperda* Abbot and Smith by Ph. Luginbill (Columbia No. 20-1061); one male from College Park, Maryland, reared from the same host; two males from San Rafael, Peru, and one from Miami, Florida (C. H. T. Townsend); one male from Higuito, San Mateo, Costa Rica (Pablo Schild).

Type.—Male, Cat. No. 20127, U.S.N.M.

PHOROCERA TESSELLATA Brauer and Bergenstamm.

Tetragrapha tessellata BRAUER and BERGENSTAMM, Zweifl. Kais. Mus. Wien, pt. 5, 1891, p. 351; pt. 6, 1893, p. 124.

Male.—Front 0.24 of the head width (average of five, 0.23, 0.24, 0.24, 0.24, 0.25); parafrontals with yellow pollen; parafacials but little paler; frontal bristles just meeting the large bristles of the facial ridges; antennae black; tip of second joint slightly reddish, the third joint rather long and slender, about three times the second; arista thickened on the basal two-fifths; bucca about one-sixth the eye height; palpi yellow; proboscis small. Thorax with the usual rather dense yellowish gray pollen, four black stripes very distinctly visible on the dorsum when viewed from behind; dorsocentrals 4, sternopleurals 3, scutellum distinctly yellow at tip; the sternopleurae near where they join each other on the middle line bear large clusters of long, curved black bristles bending backward, these join with a few of similar size and shape on the middle coxae to form a single or slightly divided tuft which is very conspicuous and occurs in males of several species related to this one. Abdomen broadly yellow beginning on the first segment and extending continuously to the last third of the third segment, only a broad stripe in the middle black in ground color, the yellow gray pollen of these segments is confined mostly to the area next to the middle stripe and to the lateral margin; fourth segment with dense whitish pollen on the anterior half, divided on the median line by a very distinct shining black stripe, posterior half of the segment shining black; discal bristles absent on the last segment; first and second each with one pair of median marginal bristles; third segment with a marginal row of about eight; fourth segment with numerous bristles and bristly hairs on the apical half. Genital segments blackish, the united inner forceps forming a long slender process, curved at tip, flat behind except near the base where it is rounded and kneeled; outer forceps modified into flat reddish plates which bear a palpus-like prolongation at the front edge; fifth sternite deeply incised, its sides parallel, with a few hairs on the edges; fourth sternite visible in a V shape, its base concealed, its apex slightly bent down so as to be rather prominent. Legs black; middle tibiae with two bristles on the front side, hind tibiae with an uneven series on outer side; all the claws and pulvilli moderately elongated, the anterior ones most. Wings hyaline, rather narrow at tip, the fourth vein bent sharply at a right angle and provided with a distinct fold; first posterior cell rather widely open very far before the apex; third vein with five or six bristles at base.

Length 9 mm.

Described from 5 males, three labeled "E. E. A. Cuba, 8129"; one Havana, Cuba (C. F. Baker); one Mariel, Cuba (Palmer and Riley).

Type.—Male, Cat. No. 25709, U.S.N.M., from the lot first mentioned.

PHOROCERA HAMATA, new species.

Male.—Front at narrowest 0.31 of the head width. The parafrontals gray pollinose with rather long hairs outside the usual frontal bristles, the latter extending below the arista almost to the uppermost bristles of the facial ridges; antennae black, slightly brownish at base; the third joint four times the second and unusually broad at the apex. The arista thickened almost half way: palpi small, yellow; proboscis short, black. Thorax gray pollinose with the usual four stripes when viewed from behind; anterior acrostichals three pairs, posterior dorsocentrals 4; sternopleurals 3; pteropleural wanting. Abdomen quite blackish, subshining, but the basis of the first and third joints with gray pollen, which is much more conspicuous in some lights than others; there is a distinct median dark stripe. The hairs of the second and third segments are erect but not bristly. The first and second segments have a pair of smallish median marginals, the third segments a row; the fourth segment a mixture of erect bristles and hairs. The genital segments are small, reddish-brown, hairy but not bristly; the inner forceps are united into a flat, tapering piece which ends in a very slender median rather straight process, slightly bent up apically. This structure is very much like that of *claripennis* but is not so hairy on the basal part. The fifth sternite is deeply cleft and the sides of the cleft are parallel or even convergent for some distance; the lateral plates of the segment are shining black and bear a few long hairs on the outer margin. Legs black; the middle tibia with two bristles on the outer front side; claws and pulvilli all about equally long. Wing hyaline; the third vein a little bent forward at the extreme apex; the fourth vein with a slight fold at the bend which is quite square,

Length 7.5 mm.

Described from two males: one from New Haven, Connecticut, reared from the sawfly *Diprion simile* Hartig by W. E. Britton, July 19, 1915; the other " reared from several pupae under bark " by A. J. Conradi, at Clemson, South Carolina.

Type.—Male, Cat. No. 25710, U.S.N.M., from New Haven, Conn.

Although the genitalia are almost identical with those of *claripennis*, the antennae are much broader, the abdomen darker and the abdominal hairs more erect than in that species. There are other minor differences.

PHOROCERA IMITATOR, new species.

Male.—Front 0.28 of head width, yellowish pollinose with short hairs outside the frontal rows, the latter fully meeting the rows of strong cilia on the facial ridges. Antennae brownish black, the third joint very long, fully four times the second, slightly widening to the apex; arista slender, very slightly thickened on the basal fourth; bucca one-fourth the eye height; palpi long, yellow, proboscis fleshy. Thorax yellowish gray pollinose, the usual dark stripes rather narrow when viewed from behind; dorsocentrals four, sternopleurals three, one rather stout pteropleural. Abdomen broad, not elongate; the intermediate segments almost entirely pollinose, only the hind edge of the third subshining, the fourth segment mostly pollinose but more shining in certain lights; first segment without marginals, second segment with one large pair, the third segment with a row of eight, of which the median two pairs are very stout; fourth segment with dense, erect, spiny hairs mixed with bristles which also extend below on the hind edge. Genital segments small, brown, the united inner forceps forming a slender flattish tapering organ, grooved behind except at base, its tip forming a small knob which is bent a little backward, the whole hind side up to the knob covered with erect but not very dense black hair; on each side of the organ along its middle is a series of stiff spines directed toward the base about as long as the hairs. This structure as a whole is entirely different from any others examined by us; fifth sternite deeply incised, the lobes thickened along the inner side, with a few hairs on the outer. Legs black, the middle tibiae with two bristles on the outer front side, the hind tibia on the outer side with a uniform row of about 24 straight bristles interrupted in the middle by one bristle nearly twice as long. Wing hyaline, the fourth vein bent almost at a right angle and with a very slight fold, the apical cell rather widely open.

Length 12.5 mm.

One specimen Lyme, Connecticut, September 4, 1909 (Champlain Coll.).

Type.—Male, Cat. No. 25711, U.S.N.M.

Without examining the genitalia the species might be mistaken for the more common *einaris*, but is separable by having much more uniform ciliation of the hind tibiae, and especially by the presence of numerous bristles in the male along the middle line of the venter, which are absent in males of *einaris*.

PHOROCERA INDIVISA, new species.

Female only.—Front 0.35 of the head width (average of three 0.34, 0.34, 0.36), the pollen yellowish at vertex, whitish silvery the rest of the way to the mouth; frontal bristles 6 to 8, the two uppermost reclinate, the lowest attaining the level of the base of the third joint, hardly meeting the strong bristles of the facial ridges; antennae wholly black, slender, third joint almost reaching the vibrissae, second joint almost half the third; palpi yellow, the base slightly infuscated; bucca one-sixth the eye height. Thorax as in *claripennis*, but the scutellar hairs upright and stout, and the apical scutellars erect and strongly decussate; dorsocentrals 4, sternopleurals 3. Abdomen almost wholly shining black; a narrow undivided silvery band at base of second, third, and fourth segments; no discals except on fourth segment. Legs black, mid tibae with two or three bristles on outer front side, hind tibiae with uneven bristles on outer side. Wing subhyaline, fourth vein with square, angular bend and distinct fold beyond; fourth vein ending farther before the apex than usual; costal spine distinct; third vein at base with six to eight setules reaching nearly to cross vein.

Length 5 to 6 mm.

Three females, College Station, Texas, September 20 and October 1, 1921 (H. J. Reinhard).

Type.—Female, Cat. No. 25708, U.S.N.M.

PHOROCERA COCCYX, new species.

Male.—Front 0.29 of the head width, the sides with yellow pollen, the parafacials also yellow, paler below; the frontal bristles considerably overlapping the large bristles of the facial ridges. Antennae black, third joint very large and wide, gradually wider toward the tip, fully four times as long as the third; arista long and slender, the basal third slightly thickened; palpi yellow; proboscis small. Thorax with yellowish gray pollen; the dorsum with the usual dark stripes; four dorsocentrals, three sternopleurals; pteropleura with one small bristle. Abdomen slightly elongated, without discals; the hairs depressed on the second and third segments; the basal half or more of each of the last three segments with white pollen, the apical parts subshining, or in an oblique light, brown pollinose. Genital segments blackish, the united inner forceps forming a slender curved beak which is suddenly widened toward the base so that the basal half is much deeper in profile; it is deeply grooved behind, the groove filled with dense yellow hairs which extend out on the hind or upper side of the beak; the sides of the basal portion have long hairs extending backward and upward. This organ in profile has some resemblance to the head of the cuckoo (inverted), which suggested the name. The outer forceps developed into shining flat plates, as usual in this group, but larger and more conspicuous, with hairs to the apex and on the front edge. Penis larger than in most of the species; fifth sternite deeply cleft, its sides almost parallel, the lobes with numerous hairs along the edge and outer side. Legs black, the middle tibia with two large bristles on the outer front side and with an uncommonly distinct and sharp-edged ridge down the extensor side; hind tibia with sparse and uneven bristles on the outer side. Claws and pulvilli all greatly elongated. Wing subhyaline, bend of fourth vein a little oblique, with very slight fold; third vein with about five or six bristles at base.

Length 13 mm.

Described from three males, Falls Church, Virginia, August 30 (N. Banks, Coll.); Green County, New York, September 10; and Monticello, Indiana, July 24, 1885, reared from *Sibine stimulea* Clemens by John Smith.

Type.—Male, Cat. No. 25712, U.S.N.M., from Falls Church, Virginia.

PHOROCERA SUBNITENS, new species.

Male.—Front 0.26 of head with; the parafacials black and subshining as far as the second large reclinate frontal bristle, with silvery or whitish pollen from there to the mouth; the frontal bristles just meet the smallish bristles of the facial ridges; antennae black, the third joint slender, three times the second; arista enlarged on the basal third; bucca one-fifth the eye-height; palpi yellow, somewhat infuscated at the base; proboscis small. Dorsum of thorax almost entirely shining black in most lights, still from behind there is some pollen visible dividing the black portion into stripes; four dorsocentrals; three sternopleurals; the middle coxae have some uncommonly long bristles curved backward, a few of them rather wavy at the tips; the sternopleurae just before these coxae bear some long hairs which are not very stout. Abdomen mostly shining or subshining, black, the silvery pollen of segments 1, 2, and 3 divided by shining black stripes down the middle and even to the sides is of less extent than usual; discal bristles absent; the hairs of the second segment very distinctly erect and quite long, especially upon and adjacent to the black median stripe on the third segment; all the hairs of the third segment are very distinctly depressed; first and second segments each with a single pair of median marginal bristles; third segment with a row of eight; fourth segment on apical half with less numerous bristly hairs than usual in this group. Genital segments entirely black; the united forceps forming a sharp regularly tapering organ which is a little concave behind to the middle but on the basal part decidedly convex and is covered on the entire posterior side with soft dark hair; outer forceps as usual in this group modified into flat, shining plates, which at the tip are somewhat drawn out to form a palpus-like organ. Legs black; middle tibia with two bristles on the outer front side; hind tibia with an uneven row on the outer side. Wing sub-hyaline; bend of fourth vein rather far from the margin and with a long distinct fold; the bend is rectangular and the apical cell is narrowly open at some distance before the apex; base of third vein with about five bristles.

Length 6 mm.

One male; Dead Run, Fairfax County, Virginia, August 27, 1914 (R. C. Shannon).

Type.—Male, Cat. No. 25713, U.S.N.M.

PHOROCERA SULCATA, new species.

Male.—Front 0.29 of the head width; the sides with yellowish gray pollen, paler on the sides of the face; frontal bristles 8 or 9, fully meeting the ascending large bristles of the facial ridges, one or two small bristles outside of the frontal rows. Antennae long, blackish, the third joint about four times the second, wide at the tip; arista thickened on the basal third; parafacials considerably narrower than the third antennal joint; bucca not over one-fifth the eye height; palpi yellow on the apical third, becoming blackish basally; proboscis small and short. Thorax gray, pollinose, slightly yellowish on the dorsum which has the usual dark stripes when viewed from behind; dorsocentrals 4, sternopleurals 3, small fourth is present on one side and slightly indicated on the other; pteropleural with one small bristle. Abdomen wholly black in ground color with silvery pollen on the second and third segments except their apices, which in some lights are subshining; the fourth segment is shining on at least the apical half; first segment with a small pair of median marginals, second segment with a large pair; third segment with a marginal row of about ten; fourth segment with spiny erect hairs becoming bristly toward the apex. Genital segments black, the united inner forceps forming a narrow slender straight organ which does not taper much until at extreme tip which is curved forward on the back; it is deeply grooved behind on the apical half, the basal half being filled out and slightly ridged on the median line; the outer forceps form shining, reddish-brown plates which are blackened and bristly at the tip; the penis is larger than in related forms; fifth sternite shining, black, deeply cleft, the sides projecting toward each other some distance from the base. Legs black, middle tibia with two bristles on the outer front side; hind tibia with an uneven row of bristles on the outer side. Wings hyaline with fourth vein bent at a right angle, and with a very slight fold; the apical cell rather widely open; third vein with seven bristles at base reaching half way to the small crossvein.

Length 9 mm.

One male, Billy Island, Okefenokee, Georgia, June, 1912 (Cornell University Expedition).

Type.—Male, Cat. No. 25714, U.S.N.M.

Subgenus PATELLOA.

PHOROCERA LEUCANIAE Coquillett.

Phorocera leucaniae COQUILLETT, Revis. Tachin., 1897, p. 104.
Patelloa leucaniae TOWNSEND, Proc. U. S. Nat. Mus., vol. 49, 1916, p. 619.

Front of male 0.260 and in the female 0.30 (average of three, 0.30, 0.29, 0.32) the head width; parafrontals yellowish pollinose, the frontal bristles in a single row descending to the arista, two uppermost ones stout and reclinate, the sides clothed with fine inconspicuous hairs; face slightly yellowish pollinose, ridges bristly four-fifths of the way up; bucca one-fourth the eye height; palpi and proboscis yellow; antennae black nearly as long as the face, the third joint in both sexes four times the length of the second; arista thickened on the basal fourth, penultimate joint short. Thorax gray pollinose, marked with four black vittae and bearing three dorsocentral macrochaetae; scutellum grayish pollinose with four pairs of marginal bristles, the apical pair directed backward, there is also one pair on disk. Sternopleurae with three bristles. Abdomen thick, the fourth segment wedge-shaped, wholly covered with gray pollen, anal segment yellowish pollinose, sometimes a yellowish spot on the sides of the intermediate segments; first two segments usually bear a pair each of marginal macrochaetae, sometimes a pair of weak discals on the second; third with a marginal row and with or without discals, fourth with two rows one half-way the other at apex; bristly hairs of the abdomen depressed in both sexes. Legs brownish black, tibiae often brown, mid tibiae bearing a single bristle on the outer front side near the middle, hind tibiae outwardly ciliate with one longer bristle. Wing hyaline, apical cell open, fourth vein strongly arcuate beyond the bend, base of third vein with two bristles. Ovipositor concealed usually, but when visible it has no strongly chitinized process.

Length 10 to 11 mm.

Redescribed from the type specimens, from District of Columbia, Tennessee, and Kentucky, bred from *Cirphis unipuncta* Háworth and *Loxostege similalis* Guenée; and two additional from Pennsylvania and Tennessee. It has been reported from New Brunswick by Tothill, reared from *Euproctis chrysorrhea* Linnaeus; from Quebec by Chagnon and by Winn and Beaulieu, from New Jersey by Johnson and Daecke, Kansas by Tucker, Connecticut by Britton, and from North Carolina by Brimley.

Type.—Female, Cat. No. 3604, U.S.N.M.

PHOROCERA FULVICEPS Van der Wulp.

Phorocera fulviceps VAN DER WULP, Biologia, Diptera, vol. 2, 1890, p. 80.

Two male cotypes received by courtesy of the British Museum, are very close to *leucaniae* Coquillett. The latter, however, has no discals, but occasionally one or two poorly developed, while the latter has a pair on each of the intermediate segments (one bristle is absent on the third segment in one specimen): in the male there is also a difference in the length of the hairs on the front, these being long and erect in *fulviceps.*

Length.—9 mm.

Two males, Omilteme in Guerrero, Mexico, collected by H. H. Smith.

Cotypes.—Males, U.S.N.M. Cat. No. 23961.

PHOROCERA FACIALIS Coquillett.

Phorocera facialis COQUILLETT, Revis. Tachin., 1897, p. 105.

Sides of face below the frontals bristly for some distance; apical cell closed, bucca one-half the eye height.

Front of male 0.307—0.313 and in the female 0.425 the head width, the sides dull gray pruinose bearing several stout bristles outside of the frontal row; sides of face below the lowest frontals bristly one-third of the way to the vibrissae; sides of face gray pruinose, the ridges bristly nearly to the base of antennae; bucca one-half the eye height; palpi yellow; antennae as long as the face, the first and second joints usually yellowish, sometimes the third also, third joint in both sexes six times the length of second, arista thickened on the basal third, the penultimate joint short. Thorax gray pollinose, marked with four black vittae; four dorsocentral macrochaetae; scutellum black, always yellowish at apex, bearing four pairs of marginal bristles. Sternopleura with three bristles. Abdomen wholly gray pollinose with dark reflecting spots, sometimes the sides of intermediate segments are yellowish. First segment with marginals, the remaining ones with discal and marginal macrochaetae, the abdominal hairs depressed; female without piercing ovipositor. Legs black; mid tibiae with two or more bristles on the outer front side near the middle; hind tibiae subciliate. Wings hyaline, apical cell closed, fourth vein beyond the bend slightly arcuate; third vein with two or three bristles at its base.

Length 7 to 10 mm.

Redescribed from the type and allotype, a specimen of each sex collected April 30, 1895, at San Diego, Texas (E. A. Schwarz). In the United States National Museum collection there are two males, Tempe, Arizona, April 5, 1914 (D. J. Caffrey); one male, Pecos, New Mexico (Cockerell).

Type.—Cat No. 3606, U.S.N.M.

PHOROCERA MERACANTHAE Greene.

Phorocera meracanthae GREENE, Proc. Ent. Soc. Wash., vol 23, 1921, p. 126; Proc. U. S. Nat. Mus., vol. 60, art 10, 1922, p. 11, fig. 23, (puparium).

Sides of the face below the frontals bristly for some distance; apical cell open; bucca one-fourth the eye height.

Front of male 0.206 and in the female 0.32 (average of three 0.30, 0.33, 0.34.) of the head width; gray pruinose, the sides of face below the lowest frontals bristly one-third of the way to the vibrissae; no long bristles outside the frontal row; face gray pruinose the ridges bristly nearly to the base of antennae; bucca about one-fourth the eye height; palpi yellow; antennae black, as long as the face, the third joint six times the second in the male and five times in the female; arista very long and tapering, the penultimate joint short. Thorax black, gray pollinose marked with four black vittae; four dorsocentral macrochaetae; scutellum black, grayish pollinose, yellowish at the apex in some specimens and bearing four pairs of marginal bristles. Sternopleura with three bristles. Abdomen black, subshining, narrow basal portions of segments two to four gray pollinose; in certain lights this pollinose area broadens out considerably on the sides and venter; the dorsum and sides of the fourth segment shining black on the apical half. All of the segments excepting the first bear discal macrochaetae; abdominal hairs depressed. Legs black, mid tibiae with one or two bristles on the outer front side near the middle, in most specimens there are two, one long and one short; hind tibiae subciliate at most with coarse bristles of uneven length. Wings hyaline, apical cell open, the third vein bearing one or two bristles at its base.

Puparium with protruding stigmata.

Length 8 to 10 mm.

Described from six specimens; one male, Myersville, Maryland, June 4, 1914, bred from *Meracantha contracta* Beauvais. Five females from the United States National Museum collection, labeled as follows: Beltsville, Maryland, July 9, 1916; Mount Vernon, Virginia, July 4, 1917 (W. L. McAtee); Hell Canyon, Manzano National Forest, New Mexico, 7,200 feet, September 18, 1916 (C. H. T. Townsend).

Type.—Male, Cat. No. 24147, U.S.N.M.

PHOROCERA SPECULARIS, ne

One of the three species of this genus in which the parafacials are bristly below the frontals and readily separated from the others by the dark reflecting spot below each of the lowest frontal bristles.

Front of male 0.290 and in the female 0.333—0.366 of the head width, gray pruinose with a yellowish cast, subshining in the male, less so in the female; vertex somewhat blackish; sides of face below the lowest frontals bristly for some distance, the parafacials silvery with a dark reflecting spot; bucca about one-third the eye height, in some specimens slightly more; palpi yellow; antennae black, nearly as long as the face, the third joint in male five and in the female four times the length of the second; arista thickened on the basal third, the penultimate joint short. Thorax black, gray pollinose, marked with four black vittae; four dorsocentrals; scutellum black, gray pollinose, often yellowish at tip, bearing three long lateral and one shorter cruciate apical pair of bristles; there are also a widely separated pair on the disk. Sternopleura with three bristles. Abdomen thickened, black, subshining, the base and sides of each segment but the first gray pollinose; venter wholly gray pollinose. One pair of median marginal macrochaetae on the first segment, second with one pair median discal and marginal, the third with one pair discal and a marginal row, the fourth with two rows of macrochaetae on the apical half and at the apex of segment; abdominal hairs erect and conspicuous, especially so in the male. Legs blackish, mid tibiae with two or more bristles on the outer side near the middle; hind tibiae not ciliate. Wings hyaline, the anterior crossvein strongly infuscated; apical cell open, the third vein bearing two or three bristles at base.

Length 8 to 10 mm.

Described from five specimens. Two males, Hell Canyon, New Mexico, Manzano National Forest, Sept. 19, 1916 (C. H. T. Townsend); one male, labelled "Mts. near Claremont, Cal., Baker, 77—Hilton"; two females from Juliaetta, Idaho (Aldrich) and Hood River, Oregon, October 8, 1917 (F. R. Cole).

Type.—Male, Cat. No. 25715, U.S.N.M., from Hell Canyon.

PHOROCERA PACHYPYGA, new species.

?*Phorocera leucaniae* TOTHILL, Canad. Ent., vol. 45, 1913, p. 78.

Front of male 0.236 and in the female 0.292 the head width; lightly yellowish pollinose, the sides clothed with many fine hairs much shorter than the frontal bristles which extend below the arista; face silvery pruinose with a yellowish tinge, ridges bristly four-fifths of the way to the antennae; bucca at least one-third the eye height; palpi yellow; antennae brown, shorter than face, in most specimens reaching two-thirds of the way to the vibrissae, third joint in both sexes three and one-half times the second, arista thickened on one-fourth its length, the penultimate joint short. Thorax grayish, marked with four black vittae and bearing three dorsocentral bristles, scutellum grayish at base, the broad apex yellow bearing three long pairs and a shorter, usually cruciate apical pair of marginal bristles; there are also a pair on disk.

Sternopleura with three bristles. Abdomen thick, the fourth segment globose, grayish pollinose, no distinct pattern, the fourth segment black or grayish, sides of second and third segment faintly reddish; abdominal hairs erect in male, subdepressed in the female, first segment with one pair marginals, second with oue pair median marginals and seldom any discals (never any arranged in pairs) third usually with one or more pairs of discal (sometimes wanting) and a marginal row, the fourth with two rows of macrochaetae on the apical half and at the extreme apex. Legs black or brownish, mid tibiae with two or more bristles on the outer front side near the middle, hind tibiae sub-ciliate at most. Wings hyaline, apical cell open, fourth vein beyond the bend not especially arcuate; the third vein bearing two or three bristles at its base. Hypopygium concealed, the inner forceps are somewhat longer than the outer ones, curving slightly inward, the outer side of both pair are clothed with short hairs.

Length 8 to 10 mm.

Described from a large series of both sexes collected at Lunenburg, Massachusetts, May, 1914 (R. T. Webber): one male, Juliaetta, Idaho (Aldrich); one male, Cincinnati, Ohio, April 7, 1900; one female, Germantown, Pennsylvania, April 28, 1906; one male, Caroline, New York, April 11, 1917 (S. H. Emerson); two males, Heckton Mills, Pennsylvania, May 8, June, 1909 (W. R. Walton); one male Pittsburgh, Pennsylvania (G. A. Ehrman); one male, Plummer Island, Maryland, May 10, 1916 (W. L, McAtee); one female, Kansas City, Missouri, April 21, 1899.

This species is an important parasite of the brown tail moth, *Euproctis chrysorrhea* Linnaeus in New England and is probably the species referred to by J. D. Tothill, above cited, as having this host.

Type.—Male, Cat. No. 25716. U.S.N.M., from Lunenburg, Massachusetts.

PHOROCERA SETIFRONS, new species.

Front in male 0.42 and in the female 0.47 and 0.43 the head width, silvery, the sides with many stout bristles outside the frontal row; head of male triangular, the front in profile projecting forward a distance equal to the eye width, in female not so strongly produced; face silvery, at their narrowest part nearly one-half as wide as the median depression; facial ridges bristly four-fifths of the way to antennae with many long closely set bristles; bucca nearly one-third the eye height; palpi yellow; antennae slightly shorter than the face, the third joint in both sexes four times the length of second, arista thickened on the basal fifth, the penultimate joint short. Thorax gray pollinose, marked with four black vittae and bearing three dorsocentral macrochaetae; scutellum grayish with three or four pairs of long marginal bristles. Sternopleura with three bristles. Abdomen black, grayish pollinose, the abdominal hairs long and erect and readily confused with the macrochaetae. Legs black, mid tibiae with two bristles on the outer front side near the middle; hind tibiae ciliate with one or two longer bristles. Wings hyaline, apical cell open, the third vein with two or three bristles at base.

Length 10 to 11 mm.

Described from one male and two female specimens collected by Frederick Knab, May 1907, at Oxbow, Saskatchewan.

Type.—Cat No. 25717, U.S.N.M.

PHOROCERA SILVATICA, new species.

Front of male 0.23 and in the female 0.35 the head width, silvery pollinose; little if any blackish pollen at vertex (in female the sides of front are silvery pollinose with a yellowish tinge, and are clothed with many long fine hairs outside the frontal row); parafacials silvery pollinose; in the male at narrowest part about one-third the width of the median depression; bucca one-third the eye height; palpi yellow; antennae five-sixths the length of face, black, the third joint largely reddish, in the male four times the second, arista tapering gradually to apex, penultimate joint short. Thorax grayish marked with four black vittae and bearing three dorsocentral macrochaetae; scutellum black, only the tip yellowish, with four pairs of marginal and one pair of discal bristles. Sternopleura with three bristles. Abdomen thick, black, sprinkled with grayish pollen, the abdominal hairs sub-erect at most and distinct from the macrochaetae; first segment with one pair of marginals, intermediate segments with two or three pairs of discals besides the marginals, and the fourth wholly covered with macrochaetae. Legs black; mid tibiae with two bristles on the outer front side near the middle; hind tibiae subciliate at most; front pulvilli less than twice the length of the hind ones. Wings hyaline, apical cell open the length of the small cross vein, costal spine small but distinct, third vein at base bearing two or three bristles. Hypopygium blackish, the inner forceps slightly swollen at base and about three-fourths the length of the outer ones, clothed on the outer side with fine short hairs. The fifth sternite is noticeably lobe like.

Length 10 mm.

Described from a male and female specimen taken at Cranbrook, British Columbia, May 11–12, 1919, by C. Garrett. The species is closely related to *fuscimacula*, but differs mainly as follows: width of head at vibrissae greater; bucca wider; face at narrowest part wider; front at vertex wholly silvery pollinose; hind tibiae subciliate at most, etc.

Type.—Male, Cat. No. 25718, U.S.N.M.

PHOROCERA PLURISERIATA, new species.

Front of male 0.300 of head width, silvery, the vitta equally as wide as either parafrontal; frontal bristles arranged in several irregular rows, the two uppermost bristles of the inner row being stout and reclinate, face silvery, the sides at narrowest part one-third the width of the median depression; bristles of the facialia in a single row; bucca one-fifth the eye height; eyes thickly hairy; palpi yellow; antennae nearly as long as face, the third joint five times the length of the second, arista thickened on the basal three-sevenths, penultimate joint short. Thorax grayish, pollinose, marked with four black vittae bearing three dorsocentral macrochaetae; scutellum black on the basal fourth, the apex yellowish with three long and one short cruciate pair of marginal bristles; disk thickly beset with fine long hairs, excepting at its apex which is bare, no bristles. Abdomen black, gray pollinose, especially so at the base of segments, first segment with marginals, the remaining ones with both discal and marginal macrochaetae. Femora and tarsi black, the tibiae brownish; mid tibiae bearing two bristles on the outer front side near the middle; hind tibiae ciliate with one longer bristle near middle; front pulvilli twice as long as those of the hind tarsi. Wings hyaline, apical cell open about one-half the length of the small cross vein, costal spine short and of the same length as the adjacent bristles, third vein with two bristles at its base. Hypopygium blackish, the inner forceps with a slight swelling at base and about the same length as the outer ones, the former near the base, with a striking tuft of long black hairs three times the length of the forceps.

Length 10 mm.

Described from one male specimen collected at Grizzly Peak, Berkeley Hills, California, received in exchange from the Academy of Natural Sciences, Philadelphia.

Type.—Male, Cat. No. 25719, U.S.N.M.

PHOROCERA FUSCIMACULA, new species.

Front of male 0.28–0.30 the head width; parafrontals at vertex and nearly to the base of antennae subshining blackish; the frontal bristles reach below the arista, in the male they are in several irregular rows, in female there is but a single row of stout bristles with smaller ones outside; bucca one-fourth the eye height; parafacials silvery, with dark reflecting spot above, at their narrowest part (in male) about one-fourth the width of the median depression; facialia bristly almost to the arista; antennae black, the third joint of male slightly over four and in the female about four times the length of second, arista thickened on the basal third and tapering abruptly, the penultimate joint short. Thorax gray pollinose, marked with four black vittae and bearing three dorsocentral macrochaetae; scutellum yellowish with four pairs of marginal bristles, the apical ones horizontal. Sternopleura with three bristles. Abdomen thick, black, sprinkled with gray pollen, the abdominal hairs depressed in female, suberect in male but in nowise confused with the macrochaetae; first segment with one pair of marginals, second and third segments with two or three irregular pairs discals and the usual marginals, the fourth wholly covered with macrochaetae. Legs black, the tibiae somewhat brownish, mid tibiae with two bristles on the outer front side near the middle; hind tibiae ciliate, with several large bristles near the middle. Wings hyaline, apical cell narrowly open about one-half the length of the small cross vein, fourth vein beyond the bend strongly arcuate, third vein bearing two bristles at base. Hypopygium inconspicuous, black; inner forceps with a conspicuous hump at base, which bears a few strikingly long hairs directed forward, surpassing the forceps in length.

Length 10 mm.

Described from two males and four females, reared from *Telea polyphemus* Cramer and *Hemerocampa vetusta* Boisduval at Watsonville, Calif., by E. O. Essig, April 1920; and one female, San Diego, California (Aldrich).

Type.—Cat. No. 25720, U.S.N.M.

PHOROCERA REINHARDI, new species.

Female.—Front 0.34 to 0.37 of the head width (in two); frontal row of bristles reaching to arista, the uppermost two or three reclinate; parafrontals and parafacials wider than the average, white but not silvery, facial ridges with strong bristles reaching almost to the arista; antennae black, second joint with dense spiny bristles, third almost four times the second, reaching nearly to the vibrissae; palpi yellow, with long and rather abundant black hairs; bucca two-fifths the eye height. Thorax gray with the usual stripes; dorsocentrals 3, sternopleurals 3; scutellum yellowish at tip, with three marginals and a slender but long apical pair. Abdomen thick in profile, subglobose, of characteristic *Patelloa* shape, and with changeable gray tessellations above, the apices of the segments hardly more shining; second and third segments with small discals, the hairs erect or nearly so; first and second segments with one pair of marginals. Third segment with a stout row, of which the median ones are submarginal; fourth segment with a discal row about equal to the preceding and smaller marginals. Legs black; middle tibiae with three bristles on outer front side; hind tibiae subciliate with two longer bristles. Wings hyaline; third vein with 2–3 hairs at base; bend of fourth vein oblique, the last section perfectly straight to the costa, not concave.

Length 8.5 mm.

Described from two females, Agricultural College, Michigan, April 21, 1922 (L. G. Gentner); received from H. J. Reinhard.

Type.—Female, Cat. No. 25721, U.S.N.M.

The species resembles *leucaniae* but has three bristles on the outer front side of the middle tibiae instead of only one. In *silvatica*, of which the female is unknown, the discals are larger and the front more prominent and yellowish.

Subgenus NEOPALES.

PHOROCERA NOCTUIFORMIS Smith.

Neopales noctuiformis SMITH, Psyche, vol. 22, 1915, p. 267.

Eutritochaeta carpocapsae TOWNSEND, Proc. U. S. Nat. Mus., vol. 56, 1919, p. 580.

Front of male 0.298 of the head width, the sides gray pollinose with a yellowish tinge, bearing outside of the frontal bristles a row of shorter ones which are sometimes weak; sides of face gray pollinose, at narrowest part less than one-third the median depression; palpi yellow or brownish, facial ridges bristly one-half to three fourths of the way; bucca one-fifth the eye height; antennae as long as face, second joint very short; the third joint six times the length of second in the type; arista thickened on the basal three-sevenths, the penultimate joint short. Thorax grayish, marked with five indistinct vittae; four dorsocentral macrochaetae; scutellum black, the tip yellow bearing three long and one shorter apical pair of bristles. Sternopleura usually with three bristles. Abdomen black, last three segments grayish pollinose on their basal two-thirds; first two segments with one pair each of median marginal, third with a marginal row and the fourth with macrochaetae on the apical two-thirds; abdominal hairs erect and conspicuous. Legs black, the mid tibiae with two or more bristles on the outer front side near the middle; hind tibiae subciliate. Wings hyaline, apical cell open, the third vein with two or three bristles at its base.

Puparium with protruding stigmata.

Length 6 to 8 mm.

Paratypes at the Boston Society of Natural History, Boston, Massachusetts, and at the Museum of Comparative Zoology, Cambridge, Massachusetts, examined by the junior author. The type specimen was reared from an unknown noctuid larva taken at Revere, Massachusetts; the other specimens were collected at North Andover, Mass.; Sugar Island and Orrs Island, Maine.

Type.—Cat. No. 19237, U.S.N.M.

The types of *Eutritochaeta carpocapsae* (Cat. No. 22243) are a male and a female, reared by F. L. Wellman, at Bentonville, Arkansas, from a cocoon of the codling moth, *Carpocapsa pomonella* Linnaeus.

PHOROCERA TORTRICIS Coquillett.

Phorocera tortricis COQUILLETT, Revis. Tachin., 1897, p. 103.—NICOLAY, Ent. News, vol. 30, 1919, p. 279.—BRIMLEY, Ent. News, vol. 33, 1922, p. 25.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, 1922, p. 11, fig. 75 (puparium).

Neopales tortricis JOHNSON, Psyche, vol 23, 1916, p. 81.—WEISS, Ent. News, vol. 28, 1917, p. 220.—BRITTON, Check-list Ins. Conn., 1920, p. 193.

Front in the male 0.26 (average of three, 0.270, 0.250, 0.238) and in the female 0.288 of the head width; face and front gray pruinose, the sides of the former at narrowest part one-fifth the width of median depression; facialia bristly three-fifths of the way or more; inner eye margins concave; eyes thickly hairy; bucca one-tenth the eye-height; palpi usually yellow, often brown and sometimes black; antennae nearly as long as face, second joint elongate, the third joint in male four and one-half and in the female two and one-half times the length of second; arista thickened on the basal third, the penultimate joint short. Thorax thinly gray pollinose, marked with three broad black vittae; four dorsocentral macrochaetae; scutellum yellow, except at base, bearing four pairs of long marginal bristles. Sternopleura with two bristles usually, sometimes three. Abdomen black, subshining, the last three segments lightly gray pollinose on the basal half, often the gray pollen of the second segment is confined to the basal fourth; sides of first three segments sometimes reddish; discal macrochaetae absent in the male, usually present on the intermediate segments of the female; abdominal hairs either erect or depressed (erect in the type). Legs black; mid tibiae with two bristles on the outer front side near the middle; hind tibiae evenly ciliate. Wings hyaline, apical cell open, the third vein with two or three bristles at its base.

Length 6 to 9 mm.

Redescribed from the type and numerous other specimens of both sexes: Missouri (type, C. V. Riley); Michigan (Gillette); Milwaukee, Wisconsin; Lafayette, Indiana (Aldrich); Melrose Highlands, Massachusetts (Webber); Koehler (Walton) and Indian Spring (Townsend) in New Mexico; Plano, Texas (E. S. Tucker); Opelousas, Louisiana (Pilate). It has been reported also from Vermont, New Jersey, and Connecticut.

Rearing records: from *Mineola indiginella* Zeller in Missouri (Riley, type); from a tortricid in Michigan (Gillette, paratype); from *Cacoecia cerasivorana* Fitch (in Massachusetts by Webber, from Vermont by Johnson); from *Peronea minuta* in New Jersey (Weiss); from *Cacoecia argyrospila* Walker in Arkansas (Isely, unpublished).

Type.—Male, Cat. No. 3603, U.S.N.M.

PHOROCERA ERECTA Coquillett.

Phorocera parva Bigot, Coquillett, Revis. Tachin., 1897, p. 103.

Phorocera erecta Coquillett, Proc. U. S. Nat. Mus., vol. 25, 1902, p. 112.—Gibson, Rept. Ent. Soc. Ontario, 1918 (1919), p. 117.—Britton, Check-List Ins. Conn., 1920, p. 193.—Greene, Proc. U. S. Nat. Mus., vol. 60, art. 10, 1922, p. 11, fig. 52 (puparium).

Exorista loxostegeae Reinhard, Annals Ent. Soc. Amer., vol. 14, 1921 (1922), p. 331.

Front of male 0.29 (average of three 0.27, 0.30, 0.29) and in the female 0.32 (average of three 0.34, 0.33, 0.30) the head width; silvery pruinose, slightly blackish at vertex; the sides destitute of macrochaetae outside of the frontal row; frontal vitta about as wide as either parafrontal; facial ridges bristly about seven-eights of the way sometimes much less so; face silvery pruinose, the sides at the narrowest part one-fifth the width of the median depression; bucca one-fifth or less of the eye height; palpi black; antennae black, nearly as long as the face, the third joint in male six and in the female about four times the length of second, arista thickened on the basal third, the penultimate joint about as broad as long. Thorax black, gray pollinose, marked with five black vittae, the middle one very narrow, the outer ones broken at the suture; four dorsocentral macrochaetae; scutellum black, often yellowish at the tip, bearing two long and one short pairs of marginal bristles, and a pair of erect apicals. Sternopleura with four bristles. Abdomen black, the bases of the last three segments thinly gray pollinose, the pollen often extending nearly to the apex, sometimes the sides of the intermediate segments reddish. First segment with one pair of median marginals, the second with one pair discal and one pair median marginals, the third with discal and a marginal row, the fourth with upright bristles and two rows of macrochaetae, one at the apical half and the other at the extreme apex, abdominal hairs depressed. Legs black, mid tibiae with one bristle on the outer front side near the middle; hind tibiae ciliate, with one longer bristle. Wings hyaline, apical cell open, third veing bearing one or two bristles at its base.

Length 6 to 8 mm.

Redescribed from the type specimen and thirteen others, of both sexes, including a set of four paratypes of *loxostegeae* presented to the Museum by Mr. Reinhard. The type is a female, and there is a male bearing the same Bureau of Entomology number, 439L; they were reared from *Loxostege similalis* Guenée from Camden, Arkansas.

Other specimens are from Los Angeles, California (Coquillett) (presumably a paratype); Harrison, Idaho (Aldrich); Victoria, Texas, bred from *Loxostege similalis* Guenée (McCarthy); Kennewick, Washington, bred from leaf roller (Newcomer); Mountain Grove, Missouri (Somes); Wichita, Florida "parasite of *Epicauta* (?) on beet." Reinhard reared his material from *Loxostege similalis* Guenée. The species has also been identified by the senior author in material not now in the Museum as follows: Reared from *Desmia funeralis* Huebner by B. A. Porter at Wallingford, Connecticut; reared from *Pyrausta nubilalis* Huebner by S. C. Vinal at West Medford, Massachusetts, and by D. J. Caffrey at Cambridge, Massachusetts.

Type.—Female, Cat. No. 6215, U.S.N.M.

PHOROCERA COMSTOCKI Williston.

Phorocera comstocki WILLISTON, in Scudder's Butterflies of New England, vol. 3, 1889, p. 1922.—COQUILLETT, Revis. Tachin., 1897, p. 104.—TOWNSEND, Psyche, vol. 6, 1893, p. 467.—BRIMLEY, Ent. News, vol. 33, 1922, p. 25.

Front of male 0.39 (average of three, 0.38, 0.39, 0.39) and in the female 0.39 (average of three, 0.38, 0.39, 0.41) of the head width; parafrontals silvery, the upper two stout, strongly reclinate frontal bristles are distinctly outside the row; in the male there is one row, in the female two irregular rows of bristles outside the frontals; the median vitta is narrow, less than one-third the width of front; face silvery pruinose, the sides below the frontals bare; facial ridges bristly nearly to the base of antennae, bucca one-sixth the eye height; palpi yellow; antennae as long as face, the first two joints and the basal half of third, reddish; third joint of male five times the second, in the female somewhat shorter, arista thickened on the basal third, sometimes nearly half way, the penultimate joint about as long as broad. thorax gray pollinose, marked with four black vittae; four dorsocentral macrochaetae; scutellum grayish pollinose, the tip yellowish, bearing three pairs of strong marginal bristles and a weak pair of apical ones; there are also a weak pair on disk. Sternopleura with three bristles, the lower large. Abdomen black, the last three segments gray on their basal three-fourths and in striking contrast with the black apices, which have a rather definite line of demarcation; discal and marginal macrochaetae present on all segments but the first, which bears one pair of marginals. Legs black, mid tibiae with one bristle on the outer front side near the middle, hind tibiae ciliate with one large below middle. Wings hyaline, although the veins are very brownish; apical cell narrowly open; the third vein with two bristles at its base.

Length 8 to 10 mm.

Redescribed from nine specimens of both sexes in the National Museum, all of which were reared from *Megathymus yuccae* Boisduval and LeConte from South Carolina; the years of emergence were 1874, 1877 and 1892. Two of the lots at least (the later ones) were sent in by Dr. J. H. Mellichamp of Bluffton, S. C. Williston described two specimens from Riley, mentioning the same host; so it is practically certain that the types were from one of the two earlier lots above mentioned. None of our specimens are labeled as types, but there is one type at the Museum of Comparative Zoology, Cambridge, Massachusetts, which has been examined by the junior author.

The species has been reared from *Lophyrus*, species and *Pyrausta penitalis* Grote by Forbes (Townsend); and from *Cossula magnifica* Strecker (Brimley); localities Illinois and North Carolina.

PHOROCERA TEXANA, new species.

Essentially the same as *Phorocera comstocki*, except that the abdomen is black, thickly covered with gray pollen and devoid of definite pattern; the fourth segment is entirely gray pollinose. The front in the male is somewhat narrower, about 0.36 the head width (average of three, 0.36, 0.35, and 0.375); in one female 0.37.

Described from eight males and two females, bred in three lots from *Melitara* species in *Opuntia;* five were reared at Victoria, Texas, by J. D. Mitchell, one at Corpus Christi, Texas, by F. C. Pratt, and four at Uvalde, Texas, by J. C. Hamlin. Emergence in October and November.

Type.—Male, Cat. No. 25722, U.S.N.M., from Victoria, Texas.

PHOROCERA FLAVICAUDA Van der Wulp.

Phorocera flavicauda VAN DER WULP, Biologia Centrali-Americana, Diptera, vol. 2, 1890, p. 88.

Front of male 0.314 of the head width, golden pollinose, the sides with many fine black hairs, face golden pollinose, the ridges bristly nearly to the base of antennae; bucca about one-fifth the eye height; palpi yellow; antennae blackish, as long as the face; the third joint of male six times the length of second, arista thickened on the basal fourth, the penultimate joint short. Thorax black, gray pollinose, marked with four black vittae; four dorsocentral macrochaetae; scutellum black, gray pollinose, sometimes slightly reddish at tip, bearing three long and one shorter upturned pair of apical bristles; sternopleura with four bristles. Abdomen black, gray pollinose, the anal segment yellowish; no discal macrochaetae present; first and second segment with one pair each of median marginal bristles, the third with a marginal row and the fourth thickly beset with bristles of various lengths, one row in particular near the apex of segment being nearly as long as the macrochaetae of the third segment; abdominal hairs suberect. Legs black, mid tibiae bearing one long and one short bristle on the outer side near the middle; hind tibiae ciliate with one longer bristle. Wings hyaline, the apical cell open; third vein with two bristles at its base.

Length 10 mm.

Redescribed from a male specimen, labeled "Guanajuato, Mexico." Other specimens determined by Coquillett as this species show considerable variation. A female, from Louisiana, agrees quite well in main part, but has the sides of front bare outside of the frontal row. The antennae are shorter than face, third antennal joint four times the second, front 0.340 of the head width, ovipositor visible and shows a strongly chitinized process. One male from Mexico has the anal segment black, the front wide in the male 0.362 of the head width and the sides of the second abdominal segment reddish; in still another specimen from California, a male, the anal segment is black, face and front silvery, the latter 0.300 of the head width and the sides and a good part of the dorsum of the second and third abdominal segments reddish. Identification from Van der Wulp's description is not at all satisfactory but until more material is available, the specimens had better remain under this name.

Type.—In British Museum.

PHOROCERA PARVITERES, new species.

Front 0.27–0.30 in male (in three), 0.32 in female (one) of the head width; front rather short and horizontal in male but not strongly protuberant at the antennae. Parafrontals and parafacials light golden pollinose, the former without unusually dense erect hair; the sparse frontal rows reaching about to arista, with two recurved above; parafacial at narrowest half as wide as third antennal joint. Antennae black, third joint long, six times the second in the male, five times in the female, arista thickened on basal third; palpi yellow. Thorax gray pollinose with the usual black stripes, four dorsocentrals, generally four sternopleurals, but the lower two small and sometimes only one of them developed and that but slightly; scutellum with three marginal, a pair of erect decussate apicals, and a pair discal. Abdomen gray, second and third segments rather uniformly colored but with a median black line, no discals even on the fourth segment, which has contrasting yellow pollen, but still showing the median line. Abdominal hairs erect on median line on second segment, elsewhere depressed. In certain lights the second and third segments show a broad darker area each side. Genitalia of male small.

Legs black, mid tibiae with one bristle on outer front side, hind tibiae with a poorly developed row. Pulvilli in male as long as last tarsal joint, half as long in female. Wings hyaline, third vein with 2–3 hairs at base, curve of fourth vein nearly a right angle but rounded, concave toward tip, the apical cell disproportionately wide at the bend. The third costal segment (beyond the auxiliary) equals the fifth.

Length 5.5 to 6.5 mm.

Described from five males and one female, College Station, Texas, September 21, to October 9, 1920 (H. J. Reinhard).

Type.—Male, Cat. No. 25723, U.S.N.M.

The species is much like *flavicauda* Van der Wulp, as identified by Coquillett in a Mexican specimen in the United States National Museum; but the latter has a wider front (0.33 in the male), which has dense erect hairs. It also has a well-ciliated hind tibia and other small differences.

PHOROCERA STERNALIS Coquillett.

Phorocera sternalis COQUILLETT, Proc. U. S. Nat. Mus., vol. 25, 1902, p. 112.
Phyllophorocera sternalis TOWNSEND, Proc. U. S. Nat. Mus., vol. 49, 1916, p. 621.

Front of male 0.320 and in the female 0.326–0.361 of the head width, sides gray pruinose clothed with bristly hairs outside the frontal row; face gray pruinose the ridges bristly on their basal three-fourths, bucca one-fifth or less the eye height clothed with long black hairs in the male, less so in the female; antennae as long as the face; third joint in male broad, convex in front, six times the second; in the female plain, three times the second; arista thickened nearly to the middle, the penultimate joint about as long as broad, in some specimens slightly elongate. Thorax gray pollinose, marked with four black vittae, four dorsocentral macrochaetae, scutellum black at base, the apex broadly yellow, bearing three long and one short apical pair of marginal bristles. Sternopleura with four bristles. Abdomen black, shiny, the basal portions of the second, third, and fourth segments gray pollinose; all of the segments with marginal and the last three with discal macrochaetae. Legs black; mid tibiae bearing two or more bristles on the outer front side near the middle; hind tibiae coarsely subciliate at most (there is no even fringe of bristles). Wings hyaline, the apical cell open, third vein with two bristles at base.

Length 7 to 8 mm.

Redescribed from the type male from Franconia, N. H. (Mrs. Slosson); one female from East Eddington, Maine (Hough); and one female from Moscow, Idaho (Aldrich).

Type.—Male, Cat. No. 6214, U.S.N.M.

PHOROCERA INCRASSATA Smith.

Phorocera incrassatus SMITH, Proc. Ent. Soc. Wash., vol. 14, 1912, p. 121.

Front in female 0.312 of the head width, head nearly one and one-half times as broad as long, parafrontals and parafacials yellowish gray pollinose, facial ridges bristly a little over half way; sides of face below the frontals bare; bucca one-fifth the eye height; palpi yellow; antennae not quite as long as the face, the third joint four times the second, arista thickened on the basal three-sevenths. Thorax black, lightly gray pollinose with a yellowish tinge, marked with four black vittae; four dorsocentral macrochaetae; scutellum black, slightly yellow at tip, with three pairs of long marginal bristles besides the shorter apical pair. Sternopleura with three bristles. Abdomen black, the base of segments gray pollinose, abdominal hairs depressed, first segment with a pair of marginal macrochaetae, second with two pairs of discal and one pair median marginal, third with two pairs discal and a marginal row, the fourth with macrochaetae on the apical two-thirds. Legs brownish black, mid tibiae with two bristles on the outer front side near the middle, hind tibiae thinly ciliate. Wings hyaline, apical cell open, the third vein bearing two or three bristles at its base.

Length 7 mm.

Described from one female specimen collected at Moscow, Idaho (Aldrich).

Type.—Male, Cat. No. 14698, U.S.N.M.

PHOROCERA XANTHURA, new species.

Male.—Eyes not very densely hairy. Front 0.33 of head width; the parafrontals blackish above, yellow pollinose below; parafacials also yellow pollinose; the frontal bristles extending to the arista; facial ridges with rather weak bristles which do not ascend quite to the level of the frontals. Antennae black, the fourth joint four times the second and rather wide through its whole length; arista thickened on the basal third; bucca more than one-fourth the eye height; palpi black; proboscis small. Dorsum of thorax with the usual gray pollen showing four black stripes when viewed from behind; four dorsocentrals; three sternopleurals; the sternopleurae with only a few bristles below near the median line. Abdomen rather curved downward apically; the second and third segments gray pollinose with changeable pattern; the fourth segment with dense and almost uniform yellow pollen. Genital segments small, brownish-black; the inner forceps divided, straight, slender, the outer forceps of the same length, rather stout at base, slender at tip, gently curved. Fifth sternite deeply cleft, the lobes bearing only a few hairs. Legs black, middle tibia with only one smallish bristle on the front side: hind tibia with a row of very small bristles on the outer side interrupted by one larger at the middle. Wings hyaline; bend of fourth vein decidedly oblique, not at all rectangular, the apical cell narrowly open at a distance before the apex, equal to a little more than one-half the length of the hind crossvein; third vein with two bristles at base.

Length 6 mm.

One male, Nashville, Tennessee, reared from *Papaipema nitela* Guenée (W. H. Larrimer).

Type.—Male, Cat. No. 25724, U.S.N.M.

PHOROCERA TENUISETA, new species.

Female.—Front 0.31–0.34 (in three) of the head width. The head when viewed from in front noticeably wider than high; frontals with light yellow pollen which becomes white on the parafacials; the frontal bristles extending almost to the tip of the second antennal joint, only the uppermost one reclinate; several long erect hairs adjacent to orbitals; bristles of the facial ridges becoming weak above, and in two of the specimens ending a little lower than most Phoroceras, at about the middle of the third antennal joint; antennae black, second joint reddish at apex, the third two and a half times the second; arista thickened on the basal third; bucca about one-sixth the eye height; palpi yellow, proboscis small. Thorax with thin gray pollen, the usual dark stripes rather narrow. Scutellum yellow at tip and with spiny erect bristles; four dorsocentrals; three sternopleural bristles. Abdomen rather uniformly covered with yellowish gray pollen, with a faint median dark line, the apices of the segments not shining; discal bristles present but rather small especially on the second segment; fourth segment with unusually large discals and the usual erect large hairs; a small, blunt, shining black ovipositor is just visible. Legs black; middle tibia with two bristles on outer side; hind tibia with a more uniform row than usual on the outer side interrupted by one larger. Wing hyaline, the fourth vein bent almost at a right angle; first posterior cell rather widely open a little before the tip of the wing; third vein with three or four hairs at the base.

Length 6.5 mm.

Described from three females. Two are labeled "Victoria, B. C." "Larvae received from G. DeBlois Green, from cocoon probably of an arctian." The third specimen Royal Oak, British Columbia, August 29 (J. D. Tothill).

Type.—Female, Cat. No. 25725, U.S.N.M., from Victoria. The paratypes are deposited in the Canadian National collection.

PHOROCERA UNIPILUM, new species.

Head, thorax and abdomen shining black; facialia bristly on the basal two-thirds; second antennal joint noticeably elongate.

Front of male 0.294 of the head width, parafrontals shining black, frontal bristles descend below the arista and meet those of the facialia, which are bristly about two-thirds of the way; parafacials silvery; bucca one-fifth the eye height; palpi black; antennae black, as long as the face; the second joint elongate, third about five times the length of second; arista thickened on the basal three-sevenths, penultimate joint short. Thorax black, shiny, indistinctly vittate, bearing four dorsocentral macrochaetae; scutellum black, shining, with two long and two short pairs of marginal bristles. Sternopleura with three bristles. Abdomen black, shining, only a faint trace of gray pollen at the base and sides of segments; venter thinly gray pollinose; first segment with one pair of marginal, the remaining ones with both discal and marginal macrochaetae; abdominal hairs suberect; legs black, mid tibiae with one bristle on the outer side near the middle; hind tibiae ciliate. Wings hyaline, apical cell open, the third vein with one or two bristles at its base.

Length 6 mm.

Described from one male specimen taken August 1, 1917, at Hood River, Oregon.

Type.—Male, Cat. No. 25726, U.S.N.M.

PHOROCERA MARGINALIS, new species.

Front of male, 0.315, and in the female, 0.333 and 0.342 of the head width, golden pollinose, the face and front nearly of equal width; parafacials and bucca silvery, the latter one-sixth the eye height; palpi yellow; eyes faintly hairy; facialia bristly on the basal three-fourths and just reaching the lowest frontals; antennae nearly as long as the face, third joint in male about seven times the length of the second, in the female slightly less; arista thickened on the basal third, the penultimate joint short. Thorax densely yellowish pollinose, marked with four black vittae, the outer ones broken at the suture and twice as broad as the inner ones, which are very narrow, though distinct; four dorsocentral macrochaetae; scutellum thick, yellowish pollinose, with three long lateral and one shorter upturned apical pair of bristles. Sternopleura with two strong bristles and two much weaker ones (hardly more than hairs). Abdomen destitute of discal macrochaetae, first and second segments bearing marginal macrochaetae, the third with a row, the fourth in female with a double row, one on the apical three-fourths and the other at apex; in the male the fourth segment has but a single row at its apex, the basal two-thirds being bare of macrochaetae; first segment black, the remaining ones yellowish pollinose excepting the apices of the second and third, which are black; fourth segment wholly yellowish pollinose. Legs black, mid tibiae with one bristle on the outer front side near the middle; hind tibiae weakly ciliate. Wings hyaline, apical cell narrowly open or closed; third vein with two or three bristles at its base.

Length 6 to 7 mm.

Described from one male and two females reared by C. L. Scott, from *Macaria punctolineata* Packard, Brownsville, Texas.

Type.—Male, Cat. No. 25727, U.S.N.M.

PHOROCERA HALISIDOTAE, new species.

Front of male 0.300 and in the female 0.360 of the head width; front golden pollinose, the face silvery; facial ridges bristly nearly to the base of antennae; bucca one-fifth the eye height; palpi yellow; antennae black, as long as face, third joint in male six times and in the female five times the length of second; arista thickened on the basal fourth, the penultimate joint short. Thorax black, gray pollinose, marked with four black vittae; four dorsocentral macrochaetae present; scutellum broadly yellow, bearing three long marginal and one short upturned apical pair of bristles. Sternopleura with four bristles. Abdomen black, first segment entirely so, the remaining ones gray pollinose on their basal half; apex of the fourth segment black. No discal macrochaetae, second segment with one pair median marginals, third with a marginal row and the fourth wholly covered on the apical half; abdominal hairs suberect in the male, less so in the female. Legs black, mid tibiae bearing one bristle on the outer front side near the middle; hind tibiae ciliate. Wings hyaline, apical cell closed, the third vein with two bristles at its base.

Length 6 to 8 mm.

Described from three males and three females reared from *Halisdota maculata* Harris, at Priest Lake, Idaho, August, 1901, by C. V. Piper.

Type.—Male, Cat. No. 25728, U.S.N.M.

PHOROCERA FESTINANS, new species.

Front in male 0.285 of the head width; face and front yellowish pollinose, the parafacial at its narrowest part being narrower than the third antennal joint; facial ridges bristly two-thirds of the way; bucca one-sixth the eye height; palpi pale yellow; antennae black, as long as the face, the third joint seven times as long as the second, arista thickened about half way, the penultimate joint short. Thorax black, thickly covered with yellow pollen and marked with five narrow but distinct black vittae; four dorsocentral macrochaetae; scutellum entirely yellow pollinose, the disk clothed with many small erect hairs which are much longer near the apex, and bearing three pairs of long marginal bristles, no apical ones present. Sternopleura with three bristles. Abdomen black, thickly yellowish pollinose, the first segment and narrow apical margins of the second and third segments on their sides, black; the venter and a narrow vitta on the dorsum of second and third segments are also black. First segment with marginal, the remaining ones with marginal and discal macrochaetae; fourth segment has two or three rows on the apical half. Legs black, mid tibiae with one long bristle on the outer side near the middle; hind tibiae ciliate, with one longer bristle. Wings hyaline, the apical cell open close to wing-tip, third vein bearing two bristles at its base. Hypopygium prominent, shining black.

The female differs as follows: Front 0.314 of the head width; face at its narrowest part about equal to the width of the third antennal joint; facial ridges bristly one-half way; bucca one-fifth the eye height; palpi deep yellow; third joint of the antennae three times the length of the second, arista thickened on the basal half; thorax black, gray pollinose tinged with yellow. Abdomen somewhat thickened, the fourth segment wedge-shaped.

Length 6 mm.

Described from a male and two females collected in Hell Canyon, in Manzano National Forest, New Mexico, by Dr. C. H. T. Townsend, September 19, 1916.

Type.—Male, Cat. No. 25729, U.S.N.M.

PHOROCERA LEVIS, new species.

Front prominent below, 0.29 of the head width in the male, 0.30 in the female (one of each); male with well-developed orbitals as in the female; the two uppermost frontals recurved, lower end of row reaching third antennal joint; frontal stripe narrower than parafrontal, the latter and the parafacial rather wide and deep golden pollinose, almost orange in the male; facial depression gray; palpi yellow; facial ridges bristly almost to the arista. Antennae black, five-sixths the length of the face, third joint rather narrow, nearly three times the second, arista thickened on basal third, penultimate joint short; bucca one-fourth the eye height. Thorax black, gray pollinose, with four narrow black vittae; three dorsocentrals, two sternopleurals; scutellum in both sexes with only three marginals, the middle swollen, there being no small apicals in either sex. Abdomen black, with thin yellowish-gray pollen which is slightly tessellated in the male; first and second segments with a pair of median marginals, second and third with a pair of discals, abdominal hairs depressed, still a few median ones suberect in male. Posterior half of abdominal segments subshining in male, less so in female. Forceps of male slender, inner and outer of same length and all fitting closely together although separate. Legs black, mid tibiae with one bristle at middle on outer front side; hind tibiae with a scattered row of bristles on outer side, one larger at middle. Wings hyaline, fourth vein with unusually oblique bend, especially in male; third vein with about three hairs at base.

Length 6–7 mm.

Described from one male, Wenonah, New Jersey, May 15, 1910, and from one female, Sidney, Nebr., June 29, 1915 (A. K. Fisher).

Type.—Male, Cat. No. 25730, U.S.N.M.

PHOROCERA SIGNATA, new species.

Front of male 0.33 of the head width (the same in two), of female 0.31 to 0.36 (in three), gray at vertex, the pollen becoming decidedly yellow at middle of parafrontals and continuing in this color down the parafacials. Frontal bristles about nine, the posterior two reclinate the anterior reaching to base of third antennal joint and almost connecting with the well-developed row on the facial ridge; antennae reddish, third joint black reaching almost to arista, third joint about three times the second; arista thickened on basal two-fifths. Palpi yellow. Thorax grayish pollinose, with indistinct darker stripes. Dorsocentrals 4, stenopleurals 3. Scutellum with three lateral and a small pair of apicals, the last slightly upturned, also a small discal pair. Abdomen black with subshining changeable spots in the gray pollen. A discal pair of bristles present on second and third segments in the type and most of the other specimens but absent on the second in one male and on both in the other.

Fourth segment wholly deep yellow pollinose in striking contract to the remainder. Genitalia rather large, outer forceps bare, gently curved, as long as the inner which seem united and are slender. Fifth sternite deeply notched but plain in structure. Legs varying from black to reddish; mid tibia with one bristle on outer front side, hind tibia ciliated with one larger at middle. Male pulvilli short. Wings subhyaline; fourth vein with a slightly rounded, oblique bend and no fold, ending not far before the tip of wing. Third vein with two or three setules at base.

Length 5.5 to 8 mm.

Described from two males and seven females, all reared from *Cossula magnifica* Strecker at Greenville, South Carolina, by Carl Heinrich; emerged from June 2 to July 12, 1913.

Type.—Female Cat. No. 25731, U.S.N.M.

Genus MADREMYIA Townsend.

Madremyia TOWNSEND, Proc. U. S. Nat. Mus., vol. 49, 1916, p. 622. Type and sole species, *Madremyia parva* Townsend (equals *Phorocera saundersii* Williston).

MADREMYIA SAUNDERSII Williston.

Phorocera saundersii WILLISTON, in Scudder's Butterflies of New England, vol. 3, 1889, p. 1922.—COQUILLETT, Revis. Tachin., 1897, p. 104.—BAKER, Invertebrata Pacifica, pt. 1, 1904, p. 38.—HOWARD and FISKE, Bull. 91, U. S. Bur. Ent., 1911, p. 145.—HYSLOP, Bull. 95, pt. 5, U. S. Bur. Ent., 1912, p. 117, fig.—TOTHILL, Canad. Ent., vol. 45, 1913, p. 73.—WINN and BEAULIEU, List of Dipt. of the Prov. of Quebec, 1915, p. 142 (Suppl. to 7th Rept. Que. Soc. for Protection of Plants).—LOVETT, Sec. Bien. Crop Pest Rept. Oregon Exp. Station, 1915, p. 145.—ESSIG, Inj. and Benef. Ins. of Cal., ed. 2, 1915. pp. 329, 401, fig.—COLE and LOVETT, List of Diptera of Oregon, 1921, p. 302.—GREENE, Proc. U. S. Nat. Mus., vol. 60, art. 10, 1922, p. 11, fig. (puparium).

Madremyia parva TOWNSEND, Proc. U. S. Nat. Mus., vol. 49, 1916, p. 622.

The species can be recognized by the addition of a few characters. Front broad (.37 of the head width in the male, .39 and .40 in the two females); the parafrontals shining on upper half and bearing between the usual frontals and the eye (mesad of the orbitals in the female) a row of from three to six recurved smallish bristles; palpi black; four postsutural dorsocentrals; three sternopleurals; one pteropleural, as large as the largest sternopleural; scutellum with three lateral pairs, the apicals suberect; abdomen with discals; middle tibia with three or four long bristles on the front side; third vein with three hairs near base; first posterior cell closed in the margin or with a very short petiole.

Length 4.5 to 6.5 mm.

Besides the two Townsend types of *parva* (Cat. No. 20032), which are from the Sierra Madre Mountains of Chihuahua, Mexico, altitude 7,300 feet, and Sierra Blanco Mountains of New Mexico, altitude 6,400 feet, the United States National Museum has three specimens from Harvey's Ranch, Pecos National Forest, New Mexico, altitude 10,000 feet; one from Manzanares Creek, Pecos National Forest, New Mexico; one from Rio Tularosa, New Mexico (all the preceding collected by Townsend); two Alameda County, California (Coquillett); one Ormsby County, Nevada (C. F. Baker); one Mono Lake, California (Aldrich); three Mendocino County, California (Essig); one San Francisco, California, reared by H. H. Severin from *Agrotis ypsilon* Rottenburg; one from Moscow, Idaho (Aldrich), reared from *Pieris occidentalis* Reakirt; two from California without other data. All these localities appear to be in the Canadian zone or immediately below it, those from the far south being from high altitudes.

In addition to the rearing records just given, the species has been recorded as a parasite of *Argynnis cybele* Fabricius (Williston, the type material); *Euproctis chrysorrhea* Linnaeus (Howard and Fiske); *Autographa californica* Speyer (Hyslop); *Ennomos magnarius* Guenée and *Euvanessa antiopa* Linnaeus (Tothill); *Lycophotia margaritosa* Haworth (Essig and Lovett). Published localities range from New Brunswick to California, through the northern region.

Genus MURDOCKIANA Townsend.

Murdockiana Townsend, Proc. U. S. Nat. Mus., vol. 49, 1916, p. 622; type and sole species, *Euphorocera gelida* Coquillett.

MURDOCKIANA GELIDA Coquillett.

Euphorocera gelida Coquillett, Revis. Tachin, 1897, p. 101. Point Barrow, Alaska.

The United States National Museum contains the type material, one male and two females and two males from the Alaska-Yukon boundary, 30 miles south of the Arctic Ocean; in the Academy of Natural Sciences, Philadelphia, are several specimens from the type locality. Additional characters: Black, subshining, arista thickened for half its length, proboscis slender but not much elongated, labella large; posterior dorsocentrals four, but the third from behind smaller; sternopleurals three; apical scutellars upturned; abdomen shining black, the bases of the segments white pollinose, discals present and the hairs long and erect; abdomen with numerous long, stiff bristles on fourth abdominal segment below and behind. First posterior cell narrowly open or closed in margin; third vein with four bristles at base. The genitalia are of the Parasetigena type, the inner forceps united, long and tapering, flat behind.

Length 6–7 mm.

Type.—Female, Cat. No. 3602, U.S.N.M.

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Genera are capitalized; synonyms in italics; where there are several references, the last is generally the important one.

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RECENTLY FOUND METEORIC IRONS FROM MESA VERDE PARK, COLO., AND SAVANNAH, TENN.

By George P. Merrill,

Head Curator of Geology, United States National Museum.

1. MESA VERDE PARK, COLO.[1]

The iron described below was brought to the Museum by Dr. J. Walter Fewkes, Director of the Bureau of American Ethnology, on his return from a field inspection trip during the summer of 1922. It was found, commingled with miscellaneous rock fragments, in the Sun Shrine at the north end of Pipe Shrine House in the Mesa Verde National Park of Colorado. There was nothing in its position or surroundings to indicate that the aborigines by whom it was placed realized its ultra terrestrial origin or regarded it with other or more interest than was attached to the fragments of soft sandstone and other rock débris with which it was associated.

As found, the iron—in the position indicated in the plate—stood 16 cm. in height by 10 cm. in breadth and 8 cm. in maximum thickness and weighed when cleaned 3.52 kilograms. It was considerably oxidized and many of the depressions partially filled with the oxidation products. The characteristic thumb marks or depressions are still in evidence, sufficiently plain to enable one to pronounce at once upon its meteoric nature. There are no broken surfaces, and evidently it represents a "complete individual." An etched surface (pl. 1, fig. 3) shows it to be a medium octahedrite of ordinary type. The kamacite bands are slightly swollen and plessite areas are proportionally abundant. Schreibersite and taenite are quite inconspicuous except under a glass. No secondary granulation (metabolism) is recognizable. Doctor Fewkes says that the position of the find was such as to indicate with a fair degree of certainty that it was placed there during the period of construction, and therefore that the time of fall can not be later than the thirteenth century, the date commonly assigned to these ruins.

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[1] Museum Catalogue, No. 645.

It would seem strange that the iron had not excited more than passing notice by the native builders, but, as stated, there is nothing to indicate that it received other attention than that given to the Cretaceous fossiliferous limestone and sandstone fragments with which it was commingled. There is, however, a singular lack of evidence to show that the early American, even down to the modern Indian, realized the possible uses of metal, although quick to discriminate in the character of stone selected from which to make his weapons or articles for domestic use. The writer has elsewhere[2] called attention to the abundant small, sharp-edged thin flakes of meteoric iron found lying on the surface in the vicinity of the Canon Diablo crater. Many of these would seem to have been admirably adapted even in their natural condition to cutting and scraping purposes or even to weapons, but thus far there has not been put on record a single case of such usage. That the fall was an ancient one is beyond question, yet through all the hundreds of subsequent years the material has been ignored, if not wholly overlooked.

2. SAVANNAH, HARDIN COUNTY, TENN.[3]

The meteoric iron figured and described in the following pages was brought to my attention by Prof. Wilbur A. Nelson, State geologist of Tennessee, who reports that it was found by Messrs. C. D. Wright and M. W. Spencer while working on the road forming the main highway between Savannah and Cerro Gordo in Hardin County and some 4 miles northeast of the first-named town. The mass was brought to the survey office of the State geologist under the supposition that it was an iron ore, and there identified. In the autumn of the present year it was sent to the National Museum, where it has been cut along its greatest diameter and etched and portions submitted for analysis with results given below.

As found the iron is in form of a rough, somewhat flattened, dumbbell-shaped mass (see pl. 2) greatly oxidized on the exterior surface. Its maximum dimensions were 143.5 by 25.5 by 16.5 cm. and its weight some 60 kilograms (135 pounds). Neither dimensions nor weight can be given accurately, as small fragments of oxidized material were continually scaling away.

An etched surface shows the iron to be, with the exception noted later, a normal coarse ochtahedrite but much pitted by oxidation, which has so deeply penetrated the mass as to greatly weaken it and render it liable to fracture through the middle or most constricted portion. The kamacite bands are quite variable, being at times of uniform thickness throughout or again swollen, as is shown in the plate. Plessite areas are abundant and large, varying in size up to 10 mm. in diameter. No troilite nodules are visible on the cut surface, and no schreibersite. The taenite is visible on the etched surface only in the usual disconnected thin films.

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[2] Contributions to the Study of the Canon Diablo Meteorite, Smithsonian Misc. Coll., vol. 50, pt. 2, 1907. Note particularly pl. 21.

[3] Museum Catalogue, No. 706.

The striking feature of the iron lies in the varied orientation of the crystal plates in the center and two end portions of the mass (see pls. 2 and 3). It will be noted that in this central portion (*D*) the kamacite plates are for the most part thin, closely crowded, and lie nearly horizontally (in the figure). To the left they become separated and the structure becomes more nearly that of a normal octahedrite. On the right, however, along the somewhat wavy line *A–B*, they abut against a single disconnected row of plates extending nearly vertical and are no longer continuous throughout the remaining portion of the mass to the right. Nor are the vertical and diagonal plates *C* and *E* in the two portions quite parallel with one another, and there is a slight difference in manner of etching and in the relative thickness of the kamacite bands in the two portions. This last is most plainly noticeable in the lower part of plate 3. What portion of these differences may be due to the angle of cutting, the writer is not at present prepared to say; the appearance is certainly such as to suggest the welding of two quite similar irons along this line rather than twinning after the manner of the Mukerop, as is described by Berwerth.

Chemical analysis by Whitfield yielded:

	Per cent.
Iron	83. 021
Nickel	7. 762
Cobalt	. 333
Phosphorus	. 180
Sulphur	. 058
Chlorine	. 107
Carbon	. 475
Silicon	None.
Manganese	None.
Copper	None.
Metallic oxides	5. 895
Water	1. 290
Insoluble	. 846
	100. 017

The 5.895 per cent metallic oxides yielded ferric oxide (Fe_2O_3), 4.995 per cent; nickel and cobalt oxides ($NiO-CoO$), 0.94 per cent. The 0.846 per cent insoluble yielded 0.242 per cent iron. A "direct" determination gave 87.802 per cent total iron. This is a little below the average for a coarse octahedrite, though, as usual, this is com-

pensated for by a correspondingly high content of nickel, as exemplified also in the irons of Bendego, Canyon City, and Magura. Otherwise the results seem in no way worthy of remark, unless the absence of copper and tin should be so considered.

EXPLANATION OF PLATES.

Plate 1.

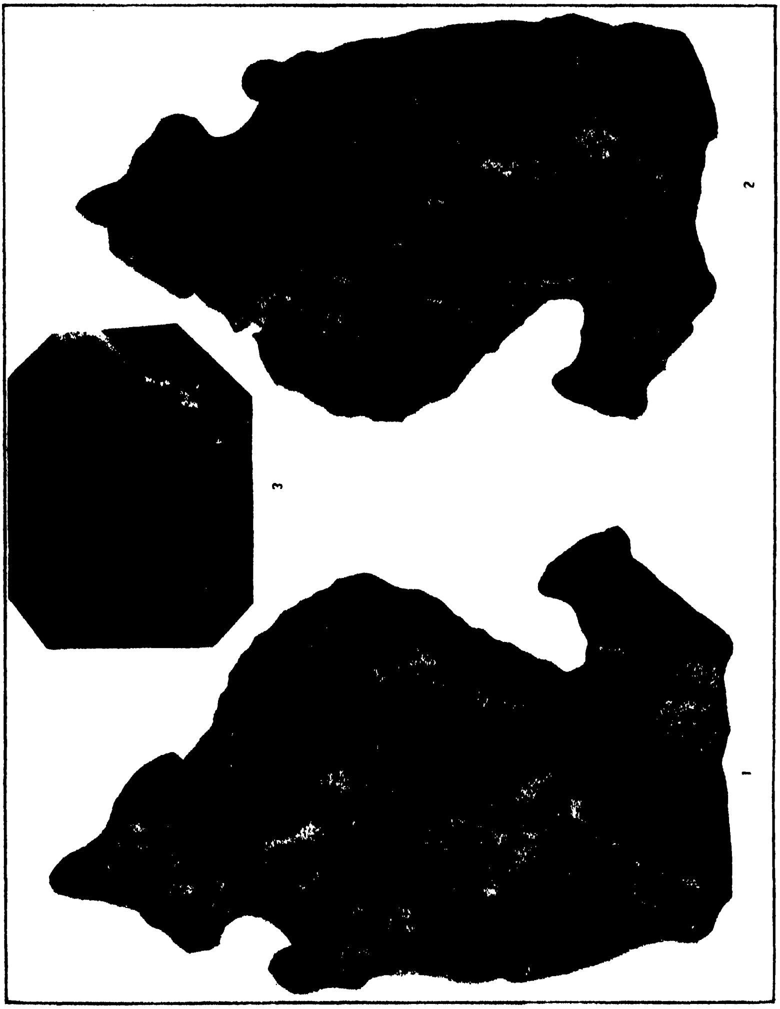
Figs. 1 and 2.—Mesa Verde iron in reversed positions. Fig. 3.—Etched surface of portion of Mesa Verde iron.

Plate 2.

Etched surface of Savannah meteoric iron; full-length section.

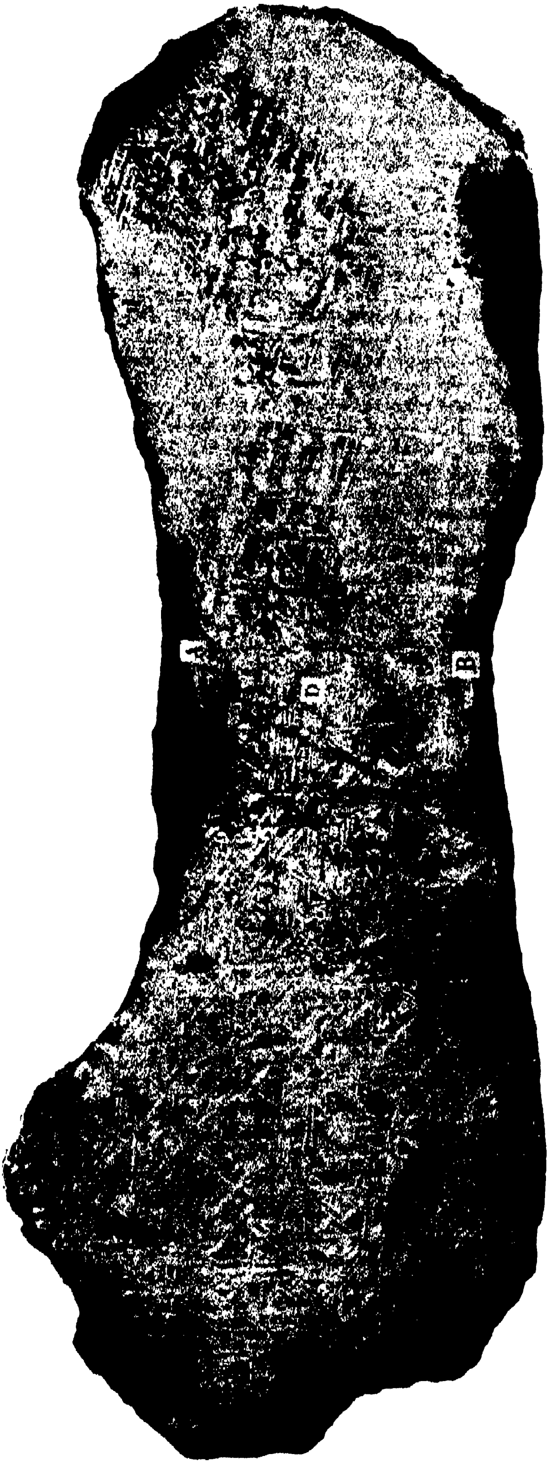
Plate 3.

Etched surface central portion of Savannah meteorite enlarged.



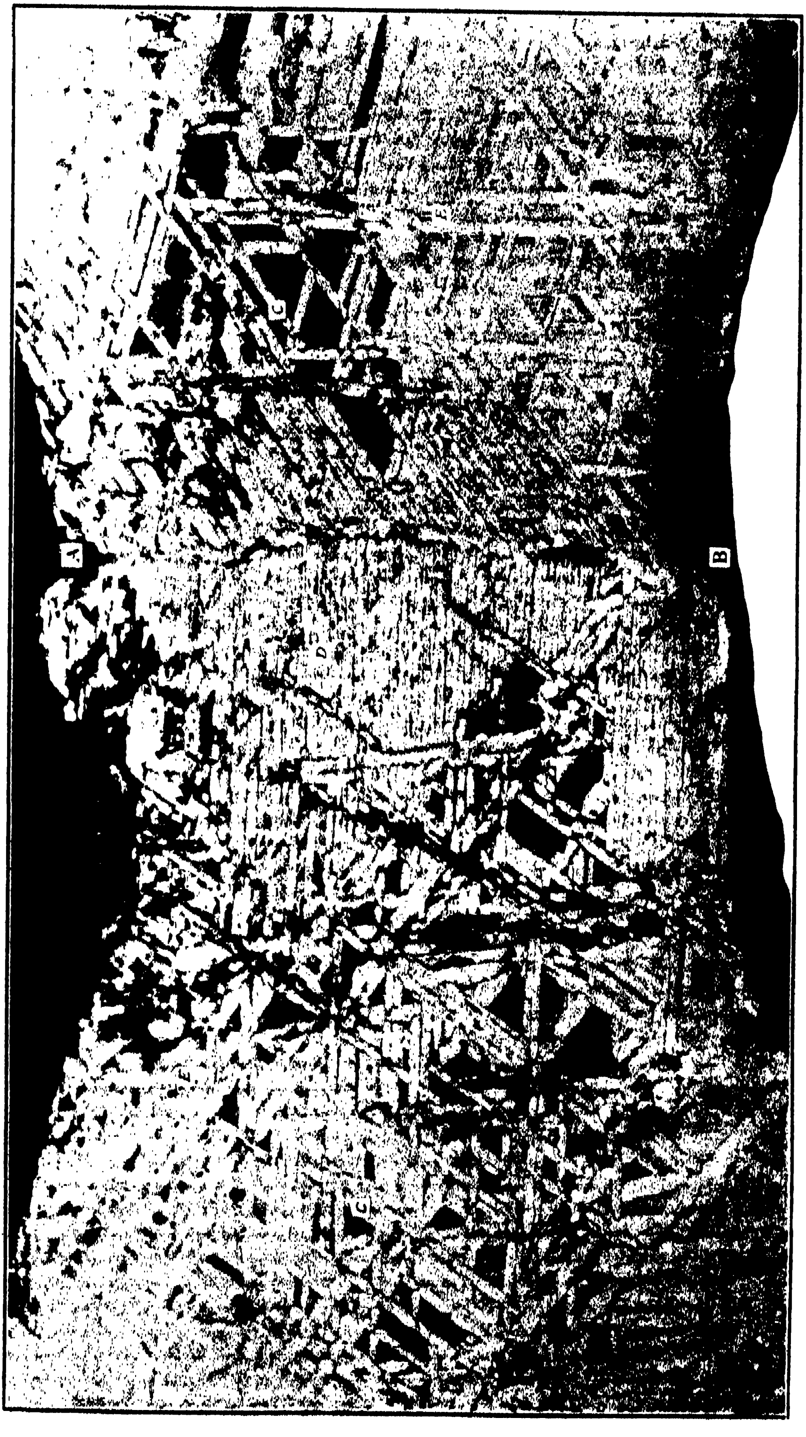
Mesa Verde Park, Colorado, Meteoric Iron.

For explanation of plate see page 4.



THE SAVANNAH, TENNESSEE, METEORIC IRON.

FOR EXPLANATION OF PLATE SEE PAGE 4



THE SAVANNAH, TENNESSEE, METEORIC IRON.

FOR EXPLANATION OF PLATE SEE PAGE 4.

DESCRIPTIONS OF EIGHTEEN NEW SPECIES OF FISHES FROM THE WILKES EXPLORING EXPEDITION, PRESERVED IN THE UNITED STATES NATIONAL MUSEUM.

By Henry W. Fowler.
Of the Academy of Natural Sciences of Philadelphia,
AND
Barton A. Bean,
Of the United States National Museum.

In the preparation of a report upon the fishes collected by the Wilkes Exploring Expedition around the world, the following are described as new:

Harengula peruana, new species, from Callao, Peru.
Wilkesina, new subgenus.
Harengula fijiense, new species, from Fiji.
Anchoviella mauii, new species, from Maui, Hawaiian Islands.
Anchoviella salvatoris, new species, from Rio Janeiro, Brazil.
Rasborella, new genus.
Rasborella dubia, new species, from Indo-Malayan region?
Uropterygius fijiensis, new species, from Fiji.
Hyporhamphus salvatoris, new species, from Rio Janeiro, Brazil.
Strongylura tahitiensis, new species, from Tahiti.
Strongylura auloceps, new species, from Fiji or Samoa.
Strongylura fijiense, new species, from Fiji.
Lepthaemulon, new subgenus.
Orthopristis rhabdotus, new species, from Peru?
Ctenosciaena, new subgenus.
Sciaena dubia, new species (no locality).
Paralarimus, new genus.
Paralarimus patagonicus, new species, from northern Patagonia.
Lepidaplois trotteri, new species, from Pomotou Islands.
Chromis cupreus, new species, from "Singapore, Maui, or Samoa."
Gillellus australis, new species, from Valparaiso, Chile.
Salarias mccullochi, new species, from Billinghausen Island.
Xystreurys ribeiroi, new species, from Rio Janeiro, Brazil.

No. 2488—Proceedings U. S. National Museum, Vol. 63, Art. 19.

HARENGULA PERUANA, new species.

Head 3⅞; depth 3⅕; D. iv, 14; A. ii, 14?; P. i, 14; V. i, 7; scales 37 in median lateral series to caudal base and 4 more on latter; 10 scales transversely at dorsal origin; 18 predorsal scales; head width 2 in its length; head depth 1⅓; mandible 2⅓; dorsal base 1⅗; anal base 1¾; least depth of caudal peduncle 2⅗; pectoral 1½; ventral 2½?; snout 4 in head, measured from upper jaw tip; eye 3½; maxillary 2⅛; interorbital 4½; serrae 17?+15? (damaged).

Body well compressed, deepest at dorsal origin, contour rather ovoid, and upper edge little trenchant. Abdominal serrae distinct, edges slightly exposed. Caudal peduncle well compressed, about as long as deep.

Head large, strongly compressed, lower profile slightly more inclined, flattened sides converging below. Snout short, width 1¼ its length; eye moderate, circular, hind pupil edge nearly midway in head length. Adipose eyelid moderately developed. Mouth small, terminally superior or lower jaw protruding and upper with slight median notch, short gape scarcely evident. Maxillary to eye center, about ¾ covered by preorbital; expansion 1⅘ in eye. Front of jaws each with rather regular single row of few moderately small simple teeth. No vomerine teeth, but broad band of fine numerous teeth on each pterygoid. Tongue free, pointed, covered with similar fine teeth, also in broad patch. Mandibular rami greatly elevated on each side within mouth; each slips in cavity outside of each palatine. Nostrils little nearer snout tip than eye. Interorbital with low median ridge in front and 3 closely set supercilliary ridges on each side. Cheek, opercle, and preopercle with rather obscure striae.

Gill-opening forward to front eye edge. Gill-rakers about 18+36, slenderly lanceolate, a little longer than filaments or about 1½ in eye. Pseudobranchiae about long as filaments. Isthmus narrow slender frenum. Shoulder girdle inside gill opening with notch over pectoral origin.

Scales firmly adherent, all narrowly imbricated, largest along middle of sides and those on predorsal anteriorly with more frayed or gashed edges than others, often with about a dozen marginal lines. Circuli as very fine vertical parallel striae, and each scale also with two larger well-spaced vertical prominent striae. Dorsal and anal with broad basal sheaths of small scales; caudal base covered with moderately large scales, though smaller than those on body. Ventral with scaly flap about two-thirds length of fin. Humeral adipose area scarcely developed.

Dorsal origin nearer mandible tip than caudal base by a space equal to combined snout and eye lengths. Anal origin slightly nearer caudal base than ventral origin, fin low and largely concealed in basal sheath. Caudal damaged. Pectoral about four-fifths (tip damaged) to ventral, or slightly beyond dorsal origin. Ventral inserted nearly midway between mandible tip and last anal ray base, about one-third (tip damaged) to anal.

Color in alcohol with back above dull olivaceous. Sides, iris, and lower surface pale brassy. Fins all pale.

Length 105 mm. (caudal tips damaged).

Type.—No. 83156, U.S.N.M., from Callao, Peru, Wilkes Exploring Expedition. Only the type known. This species is closely allied with *Clupea thrissina* Jordan and Gilbert, but that is described with a dark humeral spot, certainly not evident in our example.

(Named for Peru.)

WILKESINA, new subgenus.

Type.—Harengula fijiense, new species.

Distinguished from subgenus *Harengula* by the very numerous and fine gill-rakes, which are 70 on the lower arch.

Harengula nymphaea Richardson from China and the species described below form this group.

(For Admiral Charles Wilkes, U. S. N., the distinguished commander of the U. S. Exploring Expedition 1839–1842.)

HARENGULA FIJIENSE, new species.

Head, 3⅛; depth, 3⅜; D. iv. 13, 1; A. ii, 17; P. i, 14; V. i, 7; scales, 39 in median lateral series to caudal base and 3 more on latter; 11 scales transversely at dorsal origin; 16 predorsal scales; head width, 2⅜ in its length; head depth, 1⅜; length of depressed dorsal, 1⅜; length of depressed anal, 1⅞; least depth of caudal peduncle, 2⅜; snout 4 in head from upper jaw tip; eye, 3⅛; maxillary, 2¼; interorbital, 4⅛; serrae, 14+12.

Body well compressed, with ellipsoid contour, deepest about ventral origin, and edges trenchant. Caudal peduncle well compressed, length about three-fourths its least depth.

Head moderate, compressed, profile pointed, flattened, sides convergent below. Snout long as wide. Eye long as snout, advanced or hind pupil edge about midway in head length. Adipose eyelid moderate. Mouth small, lower jaw protruding and rami well elevated inside of mouth. Maxillary reaches first third in eye; expansion 1½ in eye. No teeth. Nostril about midway in snout length. Interorbital level. Opercle smooth, only obsolete short impressions of radiating striae. Cheeks with more distinct lines radiating or sloping forward.

Gill-opening extends forward opposite front eye edge. Gill-rakers about 50+70, finely lanceolate, longer than filaments or ¾ of eye. Pseudobranchiae long as or little longer than gill-filaments.

Isthmus long slender frenum. Shoulder girdle inside gill-opening with notch below.

Scales firmly adherent, in even longitudinal rows, narrowly imbricated, and low sheath along dorsal base. Ventrals with pointed axillary flap at least two-fifths fin length. Caudal base scaled. Scales with 4 parallel vertical striae, also very numerous finer or less distinct parallel striae.

Dorsal inserted nearly midway between mandible tip and base of last anal ray, fin 2½ to caudal base. Anal inserted well behind dorsal or about midway between ventral origin and caudal base, fin low, caudal (damaged) apparently emarginate. Pectoral (damaged) reaches at least three-fifths to ventral. Ventral inserted little behind dorsal origin and not quite reaching halfway to anal. Vent close in front of anal.

Color in alcohol: Back dark bluish-brown, sides and below silvery white with brassy tinge. Iris pale or brownish-yellow. Fins pale brownish, tip of dorsal dusky.

Length 73 mm. (caudal tips damaged).

Type.—Cat. No. 82799. U.S.N.M., Fiji Island, Wilkes Exploring Expedition. Another example, paratype, with same data, showing: Head 3⅓; depth 3⅖; D. iv, 13, 1; A. ii, 16; scales 39 in lateral series to caudal base and 4 more on latter; snout 3¼ in head from upper jaw tip; eye 3¼; maxillary 2⅙; interorbital 4⅕; serrae 17+13. Length 64 mm. (caudal damaged).

The above examples differ from the other species of the genus in Polynesia in the dark tip to the dorsal.

(Named for the Fiji Islands.)

ANCHOVIELLA MAUII, new species.

Head 3; depth (at head) 5; D. iii, 12; A. iii, 11?; P. i, 13; V. i, 6; scales (impressions estimated) about 40 to caudal base; about 20 predorsal scales. Snout 4⅗ in head; eye 4; maxillary 1⅓; interorbital 6⅕; least depth of caudal peduncle 3½; head width 3⅓.

Body moderately long, well compressed, apparently deepest at gill opening, ventral edge rounded convexly and without scutes. Caudal peduncle compressed, least depth 1½ its length.

Head long, well compressed, pointed, flattened sides but slightly converging below snout conic, width 1⅙ its length and lower profile slightly concave. Eye large, hind pupil edge about first third in head. Adipose eyelid covers eye. Mouth large. Mandible extends forward little before front eye edge, though not quite to nostril, rami low. Maxillary long, straight, extends back little beyond mandibular articulation or preopercle ridge, though not quite to gill-opening. Maxillary and upper jaw edges in front with row of minute close-set simple teeth. Row along mandibular edge similar, except larger on lateral extent. Several very minute teeth as short row on front of each palatin but none on vomer. Tongue small knob in front of lower jaw. Nostril small pore about midway in snout. Interorbital moderate, scarcely elevated or with distinct median ridge and each superciliary giving off keel behind approximating nape. Cheeks long, isosceles triangle with basal width about half its length. Cheeks and opercle smooth.

Gill-opening extends forward about midway in space between front pupil edge and front eye edge. Gill-rakers about 35+40, finely lanceolate, longest much longer than filaments or about equal eye. Pseudobranchiae about half length of filaments. Isthmus long, slender frenum.

Scales caducous, few still adherent, with about 5 basal and as many transverse incomplete striae, all apparently narrowly imbricate. Dorsal and anal within scaly basal sheaths.

Dorsal origin about midway between front eye edge and caudal base. Anal inserted close behind dorsal base. Pectoral small (damaged) and not reaching much over ⅗? to ventral. Latter also small and inserted close before dorsal origin, fin (damaged) about ⅓? to anal. Vent close before anal. Color in alcohol, skin dull olive generally, sides with median broad lateral silvery sheen, better defined after anal, where it is about as wide as eye. Head, including iris, silvery-white.

Length 75 mm. (caudal damaged).

Type.—Cat. No. 82,904, U.S.N.M. From Maui, Hawaiian Islands. Another example, same data, paratype, shows: Head about 3; depth at head 5½; D. iii, 12; snout 5⅛ in head; eye 4⅛; maxillary 1⅛ interorbital 6. Gill-rakers 37+44; length 77 mm. (caudal damaged).

Though very close to *Engraulis ringens*, this species may be distinguished by its longer maxillary. Comparison was made with the only other member of the family from Hawaiian waters, *Anchoviella purpurea* (Fowler). Of this species, besides the types, nine others in the Academy show: Head 3⅓ to 3¾; depth 5 to 5¾; D. iii, 12, 1, branched rays sometimes 11, rarely 10; A. iii, 14, 1, branched rays seldom 15; scales usually 38 to caudal base, sometimes 39, 40, or 41; 9 or 10 scales transversely between dorsal origin and middle of belly; usually 20 predorsal scales, sometimes 19 or 21; snout 4 to 5 in head; eye 3⅓ to 4; maxillary 1⅓ to 1⅗; interorbital 4¼ to 4¾. Body well compressed, belly rounded. Maxillary not quite to mandible joint, toothed. Gill-opening forward to eye front. Gill-rakers 21+21, fine, 1⅓ in eye. Scaly axillary pectoral flap 1½ in fin. Dorsal origin midway between eye front and caudal base. Anal inserted immediately after dorsal base. Pectoral two-thirds to ventral. Caudal forked, lobes about equal, pointed. Broad silvery-white lateral band wide as eye. Length 80 to 89 mm.

(For Maui, the type locality.)

ANCHOVIELLA SALVATORIS, new species.

Head, 3¾; depth, 5; D. iii, 10; A. iii, 14?; P. i, 13; V. i, 6; scales (pockets) 38? in median lateral series to caudal base; 9? scales (pockets) transversely at dorsal origin; predorsal scales (pockets) 22?; snout, 4¼ in head; eye, 3⅞; maxillary, 1⅛; interorbital, 4; head width, 2½; least depth of caudal peduncle, 2⅞.

Body well compressed, moderately long, apparently deepest at dorsal origin, ventral edge rounded convexly and without scutes. Caudal peduncle compressed, its least depth 1⅔ its length. Head moderately long, well compressed, little pointed, flattened sides converging below. Snout short, little pointed wide as long, length three-fourths of eye. Eye large, hind edge slightly advanced to center in head length. Mandible forward to nostril, rami low. Maxillary straight, end rather blunt, slightly beyond preopercle ridge and mandibular articulation. Teeth fine, simple, along entire maxillary edge and slightly larger behind. Mandibular teeth equally large. Few small teeth each side of vomer, row on each palatine and broad patch on pterygoids. Nostrils near last third in snout length. Interorbital broadly convex. Cheek nearly an equilateral triangle.

Gill-openings forward about opposite front pupil edge. Gill-rakers 20+23, finely lanceolate, 1½ in eye. Pseudobranchiae about two-thirds of gill-filaments. Isthmus long narrow ridge, edge not trenchant.

Scales caducous, apparently narrowly imbricated, with about 5 basal striae and 6 incomplete vertical striae above and below marginally. Caudal base evidently scaly.

Dorsal origin about midway between eye center and caudal base, fin base nearly half of head. Anal inserted below last dorsal ray base or a little nearer caudal base than pectoral base. Pectoral (damaged) small, apparently not half way to ventral, which is inserted well before dorsal and depressed fin (damaged) apparently reaching dorsal origin. Vent close in front of anal.

Color in alcohol largely blackish-slate. Sides of head, iris, and broad lateral band on trunk silvery-white, latter about wide as eye. Fins all brownish.

Length, 95 mm. (caudal damaged).

Type.—Cat. No. 83165. U.S.N.M. From Rio Janeiro, Brazil. Wilkes Exploring Expedition.

Only the type known. Comparison with *Anchoviella browni* (Gmelin) shows it to differ in the more numerous dorsal and anal rays and larger maxillary. *A. perfasciata* (Poey) has a shorter maxillary. It is deeper bodied than *A. eurystole* (Swain and Meek), which has a shorter maxillary and broader silvery lateral band. *A. fallida* Starks[1] has 40 gill-rakers on the lower limb of the first arch, besides more dorsal and anal rays. *Engraulis brevirostris* Gunther[3] has: D. 15; lateral series of scales, 41; depth, 5⅓; head, 4½; eye, 3½ in head; maxillary dentition exceedingly fine, bone dilated and rounded behind, not extending back to mandibulary joint; dorsal origin midway between snout end and caudal base; lateral silvery band narrower in its anterior third; length, 88 mm.

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[1] Stanford Univ. Pub., 1913, p. 9, pl. 1.

(Named for San Salvador, an old name of Rio Janeiro.)

Subfamily RASBORINAE.

RASBORELLA, new genus.

Type.—*Rasborella dubia*, new species.

Body elongate, abdomen rounded. Head moderate. Eyes with free lids. Mouth oblique, moderate, terminal. Premaxillaries protractile. No barbels. Gill-rakers short, lanceolate. Pharyngeal teeth 5–5, edges serrated. Scales moderate and well exposed. Lateral line incomplete. Dorsal fin without osseous ray, inserted between ventral and anal origins. Dorsal and anal about equally large. Caudal forked.

One species.

(*Rasbora*, the typical Indo-Malayan genus.)

RASBORELLA DUBIA, new species.

Head 3¾; depth 4½; D. iii, 7, 1; A. iii, 10, i; P. ii, 14; V. i, 7; scales 43 in lateral line to caudal base, the first 14 being tubular, and 2 more on caudal base; 12 scales transversely at dorsal and anal origins; 23 predorsal scales; head width 2 in its length; head depth about 1⅗; first branched dorsal ray 1⅗; first branched anal ray 2; least depth of caudal peduncle 2⅕; caudal 1$\frac{1}{10}$; pectoral 1⅗; ventral 1⅗; snout 4 in head from upper jaw tip; eye 3; maxillary 3; interorbital 3.

Body elongate, well compressed, deepest at ventral origin, body edges all convex. Caudal peduncle well compressed, least depth about 2½ its length. Head well compressed, lower profile little more inclined than upper and flattened sides but slightly approximated below. Snout convex over surface and in profile, length about four-fifths its width. Eye large, anterior, though hind edge little behind middle in head length. Mouth moderate, well inclined, jaws about even or lower scarcely projects, edges firmly trenchant. Lips thin and developed laterally. Maxillary narrow, largely concealed, nearly extends to eye. Nostrils together, front one simple, near last two-fifths in snout and crescentic hind one closely posterior. Interorbital convex. Suborbitals narrow, cover only about one-third of cheek. Opercle and subopercle smooth. Gill-opening forward about last two-fifths in head or not quite to hind eye edge. Gill-rakers 3+12, lanceolate, fine, about two-fifths length of filaments which are 1⅗ in eye. Pharyngeal teeth 5–5, hooked and edges strongly serrate.

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[3] Cat. Fish. Brit. Mus., vol. 7, 1868, p. 392, Caxoeira, Bahia.

Scales cycloid, in nearly evenly exposed longitudinal rows, those on middle of sides largest; 2 to 5 basal radiating striae; sometimes several short apical marginal striae; circuli coarse, 17 to 20; fins scaleless, except few scales on caudal base; ventral axilla with small scale. Spawning male with 4 pearl organs on lower surface of each mandibular ramus, also cluster of smaller or minute symphyseal ones and several around snout edge; no other tubercles now apparent.

Dorsal origin little nearer caudal base than hind eye edge, first branched ray highest and fin extends nearly half way to caudal base. Anal inserted about last two-fifths of dorsal base, first branched ray highest and reaches base of last. Caudal moderately forked, lobes pointed and rudimentary rays moderate. Pectoral low, reaches slightly over two-thirds to ventral. Latter inserted well before dorsal, reaches about four-fifths to anal, not to vent, which is close before anal.

Color in alcohol: Back warm sepia, fading paler on abdomen, the under surface being glossed with bright silvery white; sides of head especially bright; iris silvery white; sides of body punctuated with minute dark brown dots which extend to anal; fins dull uniform brownish. Length 60 mm.

Type.—Cat. No. 83278, U.S.N.M., no data. Paratypes, two examples, also without data, have the head 3⅘ to 4; depth 4¼ to 4⅗ in standard body length; D. iii, 7, i; A. iii, 10, i; scales 42 or 43 in lateral line to caudal base and 4 more on latter. First 10 to 12 scales of 1.1 distinctly tubular; 10 scales transversely at dorsal and anal origins; 22 to 25 predorsal scales; snout 3¾ to 3⅛ in head; eye 3 to 3¼; maxillary 3 to 3⅛; interorbital 2¾ to 3.

Although the locality is given as "Oahu or Fiji?" such is evidently entirely erroneous, and the species may have been procured in the Old World, possibly the Indo-Malayan region?. It certainly differs from any North American cyprinoid known to us in the remarkable combination of its characters. In a general superficial way it is suggestive of certain species of the American genus *Notropis*. Its relationship should be sought, however, in the *Rasborinae*. Among the known forms of this group it would appear unique in its small scales and uniserial pharyngeal teeth. Specifically it bears considerable resemblance to *Barilius evezardi* Day, but differs in many striking characters, as its incomplete lateral line, larger fins, narrow suborbitals, and pharyngeal teeth. In *B. evezardi* only one row of scales intervenes between the lateral line and ventral origin. In *Rasborella dubia* at least 2, or even 3, would occur if the lateral line were complete.

(*Dubia*, doubtful.)

UROPTERYGIUS FIJIENSIS, new species.

Head 10⅜; depth 22; snout 7 in head; gape 3; interorbital 9¼; mandible 2¼. Body moderately compressed. Tail slightly less than combined head and trunk. Head small, well compressed, width 4 in its length. Snout conic, width 1¼ its length. Eye moderate, closer to lip than interorbital, 1¾ in snout. Gape moderate, hind pupil edge about midway in its length, completely closes. Lower jaw trifle shorter than upper. Lips rather firm, somewhat fleshy. Teeth conic, above biserial and lower biserial behind; upper inner row longer than outer, depressible; about 8 large caninelike depressible teeth in front of upper jaw; row of firm subequal lower teeth and in front inside 5 enlarged depressed teeth; vomer with single row of firm conic teeth. Front nostril short tube each side of snout tip; hind nostril simple pore, well elevated in interorbital over front pupils edge. Interorbital convex. Gill-opening about long as eye. No fins. End of tail compressed to narrow and rather thin edge which extends short space forward above and below.

Color in alcohol: Deep or dark burnt umber, marked everywhere with numerous large blackish blotches, all of which are largely uniform dark. On pharnyx blackish blotches merged more or less to form elongate streaks. Blotches of dark color on head small. Length 582 mm.

Type.—Cat. No. 82774, U.S.N.M., Fiji. Wilkes Exploring Expedition. Only the type known. The species differs from the preceding in the color pattern, different physiognomy of the head, and uniform color of the dark blotches. According to the original color sketch obtained at Lebukea, Fiji, in May, 1840.

(For the Fiji Islands.)

HYPORHAMPHUS SALVATORIS, new species.

Head, 4¾ depth, 7¾; D. ii, 14; A. ii, 14; P. i, 10; V. i, 5; scales 63 in lateral series from shoulder to median caudal base and 6 more on latter; 40 predorsal scales to head; 7 scales above lateral line to dorsal origin, 1 scale below to anal origin; snout 2⅛ in head from upper jaw tip; eye, 4; maxillary, 3¾; interorbital, 3½; combined postocular region and eye, 2⅛ in beak. Body well compressed, deepest about midway in predorsal. Caudal peduncle well compressed, about long as deep or least depth 4¼ in head. Head well compressed, flattened sides moderately approximated below, width about 3 in its length. Snout depressed, triangular as seen from above with length four-fifths its width. Eye large, rounded, close to upper profile and hind pupil edge about midway in head length. Maxillary largely concealed, vertical, apparently reaching front nostril. Teeth fine, simple, in narrow bands in jaws, lower much narrower; no vomerine teeth. Tongue depressed, pointed, free. Preorbital nearly square, length about three-fifths of eye. Interorbital level. Distinct ridge from behind and above eye to shoulder. Gill-opening extends forward nearly to front eye edge. Gill-rakers 12+28, lanceolate, about three-fourths of filaments, which are 1⅝ in eye. Isthmus narrow frenum. Scales moderately exposed. Small scales on caudal base, and if present? on dorsal and anal, now fallen. Scales with 1 to 5 rather short marginal radii, circuli not complete and moderate. Dorsal inserted much nearer ventral origin than caudal base. Anal similar, opposite. Caudal (damaged) apparently forked? Pectoral small, rather high, about 2 in head. Ventral inserted about midway between gill-opening above and caudal base, fin 3 in head or 2⅓ to anal. Vent close before anal.

Color in alcohol: Dark or dusky (evidently discolored). Narrow pale line, likely silvery-white when fresh, from shoulder to caudal base medially and expended about equal to pupil width between dorsal and anal. Fins brown.

Length, 185 mm. (caudal tip damaged).

Type.—Cat. No. 83286, U.S.N.M. Rio Janeiro, Brazil. Wilkes Exploring Expedition.

This species differs from any in the genus we have examined in the increased gill-rakers. *H. kronei* Ribeiro[3] has fewer scales (56) and its gill-rakers are not known.

(Named for Rio Janeiro, early known as San Salvador.)

STRONGYLURA TAHITIENSIS, new species.

Head 5⅓; depth 1⅓ in postocular; D. ii, 14; A. ii, 17; P. I, 11; V. i, 5; scales 315 from shoulder to caudal base medially and 15 more on latter; 206 predorsal scales to head; end of frontal process 3⅝ in rest of head posteriorly; snout width 1¼ in frontal process to eye; eye 2⅝ in postocular; interorbital 2⅓; combined eye and postocular at least 2 in beak (broken). Body partly cylindrical, rather broad above. Caudal peduncle, and body between dorsal and anal, depressed, least depth 3 in its length or 1½ in eye. Head with flattened sides moderately convergent below, width 1⅝ in postocular. Jaws slender, depressed. Eye close to upper profile, ellipsoid. Maxillary nearly reaches pupil, only upper half concealed. Band of outer teeth sharply pointed, small and a series of well spaced larger inner ones. Triangular nasal cavity long as pupil. Interorbital level, with slight though broad shallow median depression and bony surface with many rather deep-set parallel grooves or lines. Gill-opening forward nearly to front pupil edge. Gill-filaments 1¾ in eye. Scales adherent, narrowly imbricated, circuli 38 to 42, usually incomplete above and below, sometimes only one or a few of central united. Cheeks with about 19 scales to opercle ridge. Dorsal with only a very few small scales at basal front edge. Anal with similar patch covering first simple ray and fin base narrowly to base of third branched ray. Caudal base finely scaled. Lateral line extends abruptly up till midway along side of caudal peduncle close after end of dorsal fin, where furnished with very slight keel. Lateral line in front with branch extending entirely to lower pectoral axilla. Dorsal inserted slightly behind last fourth between hind eye edge and caudal base, first branch ray 1⅕ in postocular. Anal inserted at last third between pectoral origin and caudal base, similar to dorsal, first branched ray 1⅛ in postocular, Caudal (tips damaged) apparently moderately forked, lower lobe longer and at least half an eye-diameter longer than postocular. Pectoral long as postocular. Ventral 1⅜ in postocular, and its origin slightly nearer caudal base than preopercle ridge. Vent close before anal.

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[3] Ann. Mus. Rio Janeiro, vol. 17, 1915, p. 3, Iguape, Brazil.

Color in alcohol: Largely dull brownish, sides and below paler, evidently silvery-white when fresh. Obscure silvery streak, not wider than pupil, from shoulder till below dorsal, where expanded about two-thirds vertical eye-diameter in width, though not distinct beyond fin. Fins all brownish. Length 640 mm. (beak and caudal tips damaged).

Type.—Cat. No. 83424, U.S.N.M., Tahiti. Wilkes Exploring Expedition.

Known from the above example, now in good condition after its long preservation in alcohol. We first thought it identical with *Belone urvillii* Valenciennes, unknown since its original description. According to Valenciennes its head is 2⅜ times in the entire body, our example showing at least 3¼; suborbital of *B. urvillii* somewhat fastooned, covered like whole surface of jaw and opercle with scales, a character not yet found in other species, our example showing a rather smooth suborbital with traces of but very few scales; long pointed opercle of *B. urvillii* 5 times from opercle border to end of caudal, which is rounded, and in our example emarginate caudal about 9 times to end of caudal; dorsal and anal elevated, height of more elongated rays of last equals length of fin base in *B. urvillii*, and in our example lobe of anal only slightly over half of anal fin base; *B. urvillii*[4] apparently green on back and broad silvery longitudinal band, also broad blue-black band along dorsal and anal bases, though no traces of this on our example.

Our species also approaches *Belone angusticeps* Gunther,[5] based on an example 275 mm. long, in its fin-rays, though it is said to have the eye 4 in postorbital.

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[4] Hist. Nat. Poiss., vol. 18, 1846, p. 330, Vanikoro.

[5] Cat. Fish. Brit. Mus., vol. 6, 1866, p. 238, Ecuador.

But few species of *Strongylura* are known from Polynesia, and in the region where our specimen was obtained only *S. gigantae* (Schlegel) and *S. choram* (Forkal) are known.

(For the Island of Tahiti.)

STRONGYLURA AULOCEPS, new species.

Head about 3; depth 1⅜ in postocular region; D. ii, 21; A. ii, 20; P. I, 13; V. I, 5; scales about 300 from shoulder to caudal base medially and 15 more on latter; about 218 predorsal scales to head; end of frontal process to eye 3⅛ in rest of beak, width equals its length; eye about 3 in postocular; interorbital 1⅞. Body subcylindrical, surface apparently rounded or evenly convex, caudal peduncle compressed, width about half its least depth and latter about 1¼ in eye. Head with flattened sides moderately constricted below, width 1⅜ in postocular. Jaws not completely closing for at least basal two-fifths of beak. Eye close to upper profile and combined with postocular 1⅞ in beak. Maxillary concealed, extends slightly beyond front eye edge though not quite to pupil. Moderately wide band of outer small sharp-pointed teeth, row of inner larger close-set, though more so toward base of beak. Triangular nasal cavity slightly longer than pupil. Broad interorbital about level. Very shallow wide median depression extends to occiput and with slight median ridge. Distinct depression at postocular each side and another each side of occiput. Squamous area on occiput extending forward barely half way to eyes. Gill-opening extends forward to front nasal cavity edge. Very few slightly rudimentary tubercles substitute for gill-rakers. Gill-filaments about half of eye. Scales very small, crowded, largely adherent and not on dorsal or anal, though cover caudal base completely. Scales with 32 to 44 usually complete circuli. Cheeks with 19 scales to preopercle ridge, beyond which none extend. Slight branch from lateral line extends upward toward pectoral base, but without any keel along side of caudal peduncle. Dorsal origin slightly behind anal origin, at last third between pectoral origin and caudal base, front lobe of fin apparently not much over two-fifths its entire length. Anal similar, though base of last ray distant from caudal base at least for space equal to that between hind eye edge and preopercle ridge. Caudal (damaged) apparently moderately emarginate. Pectoral (damaged) about long as postocular, uppermost ray moderately large. Ventral inserted about midway between hind eye edge and caudal base, fin 1⅛ in postocular, though reaches more than halfway to vent, not quite halfway to anal.

Color in alcohol: Faded dull brownish generally. Sides and lower surfaces with traces of silvery. Fins all brownish.

Length, 485 mm. (end of beak and caudal damaged).

Type.—Cat. No. 83422, U.S.N.M., Fiji or Samoa. Wilkes Exploring Expedition.

Though listed from Fiji or Samoa, the original label simply gives Fiji. It approaches *S. choram* (Forskal) and *S. crocodila* (Le Sueur) in a general way, but the sculpturing on the head above is more prominent, and in fact more so than in any species of the genus we examined. The entirely naked opercles are also features not noticed in the other species. The origin of the anal appears slightly abortive, possibly damaged at some time, and therefore the species may normally have 1 or 2 more anal rays.

(Αὖλος, channel; κεφαλή, head; with reference to the depression on top of the head.)

STRONGYLURA FIJIENSE, new species.

Head, 3¼; depth, 1¼ in postocular; D. ii, 22; A. ii, 16; P. I, 12; V. I, 5; scales about 450 from shoulder to caudal base and 12 more on latter; about 325 scales before dorsal to head; preorbital process to eye 5¼ in rest of beak, width about equals its length; eye 2⅓ in postocular; interorbital 1¾. Body compressed moderately, though sides slightly cylindrical. Caudal peduncle compressed, width three-fourths its least depth, which is 1⅗ in eye. Head with flattened sides moderately constricted below, width 1⅔ in postocular. Jaws not completely closing for at least basal fourth of beak. Eye close to upper profile and combined with postocular 2⅗ in beak. Maxillary concealed, narrow, extends slightly beyond eye front, though not quite to pupil. Outer band of fine teeth of moderate width, minute, close set, sharp pointed. Inner row of well-spaced larger teeth become much smaller toward end of jaws. Triangular nasal cavity 1¼ in pupil. Moderately broad interorbital level, with narrow median shallow depression, broadening and deeper behind eye to occiput, though no lateral postocular depression. Gill opening extends forward opposite hind nasal cavity edge. Few slight rudimentary tubercles substitute for gill-rakers. Gill filaments 1⅘ in eye. Scales extremely small, crowded closely, adherent, not extending on dorsal and anal, though caudal base scaly. Scales with 17 to 28 basal and 30 to 52 apical circuli, usually vertical, parallel and unconnected. Cheeks with 24 scales to preopercle ridge, beyond which 6 more, though none on opercle. Slight branch from lateral line extends upward toward pectoral base, and moderate keel alongside of caudal peduncle and caudal base. Dorsal origin a little behind anal origin or about last third between pectoral origin and caudal base, front lobe of fin about 3½? in its length (last ray damaged). Anal similar, though base of last ray distant from caudal base for space slightly greater than postocular. Caudal (damaged) apparently emarginate. Pectoral (damaged) slightly longer than postocular. Ventral inserted slightly nearer caudal base than hind eye edge, fin little less than postocular, reaches 2¼ to vent or 2⅘ to anal.

Color in alcohol: Faded dull brownish generally. Sides and lower surface paler, evidently silvery white. Fins all brownish. Length. 738 mm. (caudal tips damaged).

Type.—Cat. No. 83421, U.S.N.M., Fiji or Samoa in list, though original label gives Fiji. Wilkes Exploring Expedition.

This species is unique among all members of the genus in the greatly increased number of scales.

(Named for the Fiji Islands.)

LEPTHAEMULON, new subgenus.

Type.—*Orthopristis rhabdotus*, new species.

This section of *Orthopristis* is distinguished by the increased gill-rakers and slender body, in the latter character approaching *Evapristis* Jordan and Evermann. Besides the weakly armed preopercle, the fins are scaleless.

(*Λεπτός*, slender; *Haemulon.*)

ORTHOPRISTIS RHABDOTUS, new species.

Head 3⅛; depth 3⅗; D. XIII, 14, i; A. III, 12, i; P. ii, 16; V. I, 5; scales in 64 rows close along and above lateral line to caudal base; tubes 50 in lateral line to caudal base and 10 more in latter; 9 scales above lateral line to spinous dorsal origin, 10 above to soft dorsal origin, and 14 below to spinous anal origin; 50 predorsal scales: head width 2⅒ in its length; head depth at hind preopercle edge 1⅓; fourth dorsal spine (tip damaged) about 2¼; first dorsal ray 3; third anal spine 5⅘; first anal ray 3⅓; lower caudal lobe 1⅗; pectoral 1⅛; ventral 2; snout 3½ in head from upper jaw tip; eye 4; maxillary 3½; interorbital 3⅓.

Body elongately fusiform, well compressed, deepest slightly forward and predorsal with slight keel, edges otherwise convex. Caudal peduncle well compressed, least depth 1½ its length or 4⅕ in total head length.

Head compressed, flattened sides slightly approximate below. Snout conic, long as wide. Eye round, little elevated, and hind edge very slightly before center in head length. Mouth small, closed lower jaw slightly protrudes. Maxillary with upper edge completely ensheathed by preorbital, extends beyond hind nostril though not quite to eye; expansion about half of eye. Teeth, small, simple, conic, in bands in jaws and outer row slightly enlarged. No teeth on mouth roof. Nostrils close together, similar vertical slits; front one about last third in snout; hind one slightly elevated. Interorbital convexly elevated. Preopercle armed with short weak denticles. Suprascapula entire.

Gill-opening forward opposite hind nostril. Gill-rakers 15+20, slender, lanceolate, 1⅜ in filaments, which are long as eye. Pseudobranchiae half of gill-filaments.

Scales in oblique rows above lateral lines, becoming horizontal behind, and rows below all horizontal. Scales become smaller along body edges, head above and below, and on breast. Caudal base scaly, fin covered with fine scales. Soft dorsal and anal, each with narrow basal strip of fine scales. Cheek with 16 rows of scales. Snout, preorbital, maxillary, and lips naked. Scales with 11 basal radiating striae, apical denticles 39 to 46 and circuli moderately fine. Lateral line largely concurrent with dorsal profile, inclined little at first along caudal peduncle side until midway at caudal base; tubes small, simple.

Spinous dorsal inserted close behind pectoral base; fourth spine longest and last spine twice first; fin edge entire. Soft dorsal origin slightly nearer that of spinous dorsal than caudal base; front rays elevated, but without distinct lobe. Spinous anal inserted nearly midway between fifth dorsal spine base and caudal base; spines graduated to last, though second but very slightly less than third. Soft anal like soft dorsal, only much shorter. Caudal emarginate, pointed lobes about equal. Pectoral falcate, reaches two-thirds to anal. Ventral inserted close behind pectoral base, halfway to vent.

Color in alcohol dull olive-brown, sides and below paler. Following courses of scales above lateral line a dark median line on each row, at least wide as pale interspaces; these lines oblique on anterior half of back, more or less horizontal on posterior portion. Below horizontal dark lines, equally wide, though fewer; some cross lateral line posteriorly and more or less traverse junctures of scales. Fins all deep brownish. Pectoral axil slaty. Iris brown.

Length 250 mm.

Type.—Cat. No. 83484, U.S.N.M., Peru? Wilkes Exploring Expedition.

Only the type known. It differs from the known species of the genus in the increased gill-rakers.

(Ραβδωτός, streaked.)

CTENOSCIAENA, new subgenus.

Type.—*Sciaena dubia*, new species.

Differs from the subgenus *Sciaena* in the slender, elongate, lanceolate gill-rakers, which are at least as long as longest filaments. Other characters in combination, are the apparently ctenoid scales (of which but few remain); minute teeth, in narrow bands; long maxillary, reaching nearly to hind eye edge; presence of a well-developed single barbel at chin; reduced soft dorsal rays; presence of 2 anal spines, with second enlarged and apparently nearly as long as soft anal fin; cavernous snout or muzzle and suborbital region; presence of large pseudo-branchiae; soft dorsal and anal largely scaly from bases.

(Κτεὶς, comb or gill-raker; *Sciaena*.)

SCIAENA DUBIA, new species.

Head, 3¼; depth, 3¼; D. X, I, 23; A. II, 8, i; P. ii, 18; V. I, 5; tubular scales (fallen) according to estimated pockets about 42? from shoulder to caudal base; head width, $2\frac{1}{10}$ in its length; snout 4; eye, 3¼; maxillary, 2⅜; interorbital, 4; fourth dorsal spine, 2⅛; second anal spine, $2\frac{1}{10}$; pectoral, 1⅜; ventral, 1⅛.

Body elongate, compressed, rather fusiform. Caudal peduncle well compressed, least depth about 1¼ in its length or about 3 in head.

Head compressed. Snout convex, length three-fourths its width. Eye elevated, hind edge about midway in head length, its diameter greater than snout. Mouth rather large, and lower jaw included. Maxillary reaches first three-fifths in eye, its upper edge entirely ensheathed by preorbital; expansion 3 in eye. Chin with 4 pores short median barbel. Teeth fine, minute, in narrow band in each jaw; no others. Hind nostril vertical slit, much longer than front one, which simple round pore midway in snout. Hind preopercle and suprascapula edges entire.

Gill-opening forward about to eye center. Gill-rakers 8+14, equal filaments or about 2½ in eye.

Scales mostly all fallen, few remaining ctenoid, in rows (according to pockets) apparently more or less parallel with lateral line above and horizontal below. Small scales on dorsal and caudal basally, and largest and narrowly imbricated along sides medially. Scales show about 6 basal radiating striae and about 30 short apical denticles, and circuli very fine. Lateral line apparently mostly concurrent with dorsal profile, little high along caudal peduncle side and tubes trifid.

Spinous dorsal inserted over pectoral origin, fourth spine apparently longest and first shortest. Soft dorsal inserted nearly midway between front pupil edge and caudal base, front rays slightly longer. Anal inserted nearer to caudal base than to pectoral, and second spine enlarged, greatly longer than very short first spine or reaches halfway to caudal base. Pectoral reaches at least three-fifths to anal.

Color in alcohol: Back dull slaty brown, belly and lower surface pale with silvery-white sheen. Fins and iris all dull brown.

Length, 124 mm.

Type.—Cat. No. 83309, U.S.N.M. No locality. Wilkes Exploring Expedition.

Only the above example known, and as it appears more closely allied with the Indian species it may likely have been obtained in the Philippines? It is also, unfortunately, in very poor condition. Remarkable for the combination of characters it exhibits, in many ways it resembles *Sciaena russeli* (Cuvier), but differs at once in the long gill-rakers. *S. russeli*, like *S. dussumieri* (Valenciennes), is evidently quite variable. It apparently has a much longer mental barbel, lower spinous dorsal, and usually longer maxillary. In the last character we find an example in the academy from the Philippines showing it only reaching opposite to the eye center, whereas in smaller examples, which Fowler lists as *S. dussumieri*,[6] it reaches the hind eye edge. These examples, all in the Academy of Natural Sciences, show: Head 3 to 3⅓, or 2⅜ in young; depth 3 to 3⅛, or 3¼ in young; D. X, I, 25 to 27, i; A. II, 7, i; scales close above and along lateral line 50 to 56 to caudal base; tubes about 48 in lateral line to caudal base; 7 scales above lateral line to spinous dorsal origin; 39 or 40 predorsal scales; snout 3⅛ to 3⅞ in head, 4 in young; eye 4⅓ to 5, 3 in young; maxillary 2⅓ to 2⅞, 2⅓ in young; interoribital 3⅜ to 4. Contour elongately ovoid, back but slightly elevated; length of caudal peduncle four-fifths its least depth, which 3 to 3⅒ in head, 3⅝ in young. Head width 2 to 2¾ in its length. Snout convex, length ⅘ to ⅞ its width. Eye little elevated, 1 to 1½ in snout; snout length three-fourths of eye in young; hind eye edge about midway in head length, little advanced in half grown and little backward in young. Maxillary reaches eye center, but little short of hind edge in half-grown and young; expansion 1¾ to 1⅞ in eye. Teeth fine, in bands in jaws, outer upper little enlarged; lower fine, small. Snout end with 6 porelike slits, of 3 uppermost median highest, alike; each lower lateral cleft to upper lip; chin with 4 pores, small one on front of barbel at base; barbel 1⅝ to 1½ in eye. Front nostril at least two-fifths in snout; hind one three times as large, slightly inclined slit midway between front one and snout. Interorbital convex. Hind preopercle edge rather weakly denticulated, little larger denticles in young. Gill rakers i, 5+8, ii, short points, barely one-fourth of filaments, which are 1¾ in eye; pseudobranchiae large. Scales ctenoid, in oblique rows crossing lateral line; smaller on predorsal, along soft dorsal base and out in caudal; both latter fins largely, also soft anal, with small scales; basal radiating striae 10 to 16; apical denticles 31 to 54; circuli fine; 10 rows of cheek scales; lateral line largely concurrent with dorsal profile at first, falls until horizontal close behind anal; tubes trifid or bifid. Third dorsal spine 1⅞ to 2 in head; first anal ray 2⅝ to 3⅜; second anal spine 2½ to 2⅘; second anal ray 2 to 2⅛; caudal with median rays forming obtuse point behind, 1¼ to 1½; pectoral 1¼ to 1⅜; ventral 1½ to 1⅝. In alcohol dull brown, paler below. Spinous dorsal dusted with dusky, paler dots on soft dorsal. Iris slaty. Length 63 to 173 mm.

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[6] Copeia, No. 58, June 18, 1918, p. 64.

We have also examined *S. macroptera* (Bleeker) from Sumatra, material in the academy, and it differs not only in the short gill-rakers, but also more numerous dorsal rays. *S. dussumieri* we have not seen, and it is said to have cycloid scales. *Umbrina broussonetii* Cuvier is described from "mer du Sud et de la Jamaica,"[7] though no member of the family is known from Polynesia. The Jamaican fish has 25 soft dorsal and 6 soft anal rays.

PARALARIMUS, new genus.

Type.—*Paralarimus patagonicus*, new species.

Caudal peduncle slender, rather short. Mouth inclined moderately, cleft not vertical. Lower jaw protrudes. No mental barbels. Teeth permanent in both jaws, sharp, conic, outer enlarged and few upper as canines. Interorbital moderate. Preorbital rather narrow, flat. Preopercle edge membraneous, weakly fringed. Scales of lateral line not noticeably larger than those adjacent or concealed by smaller ones. Caudal moderately scaled basally, naked terminally. Pores at snout tip and mandible tip obsolete. Gill-rakers in moderate number, elongate. Pseudobranchiae well developed. Skull firm. Anal inserted posteriorly, small, first spine nearer caudal base than ventral origin.

This genus falls in the Sciaeninae. It is allied with *Larimus* in its moderately firm and not excessively cavernous skull, moderate interorbital width, oblique mouth with projecting mandible, maxillary slipping below preorbital nearly its whole length, and general physiognomy. It differs in the more or less larger unequal biserial upper teeth. It likewise differs from *Odontoscion*, which also has fewer dorsal and anal rays. From *Corvula* it differs in the absence of canines, and from the fluviatile tropical American *Plagioscion*, in the scales of the lateral line not larger than those adjacent.

(Πυρα, near; *Larimus*.)

PARALARIMUS PATAGONICUS, new species.

Head 2⅞; depth 3⅛; D. X, I, 22; A. II, 7, i; P. ii, 13; V. I, 5; scales abount 60, counted close above lateral line to caudal base; tubes 49 in lateral line to caudal base; 10 scales (damaged) above lateral line to spinous dorsal origin, 9 above to soft dorsal origin, 9 below to spinous anal origin; predorsal scales about 36; head width 2⅛ its length; head depth at occiput 1⅜; least depth of caudal peduncle 3⅞; third dorsal spine 2; second anal spine 4¼; second anal ray 2½; caudal to median ray tip (damaged) 1¾; pectoral 1⅞ (tip damaged); ventral 2; snout 3¾ in head from upper jaw tip; eye 4⅜; maxillary 2; interorbital 3⅜.

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[7] Hist. Nat. Poiss., vol. 5, 1830, p. 189.

Body elongately ovoid, deepest at spinous dorsal origin, well compressed. Caudal peduncle well compressed, least depth about 1⅕ its length.

Head large, well compressed flattened sides very slightly constricted below. Snout convex in profile and over surface, length four-fifths its width. Eye slightly elevated, rounded, hind edge midway in head length. Mouth large, moderately inclined. Lower jaw protrudes, rather shallow. Maxillary reaches opposite hind pupil edge; expansion 1⅖ in eye. Lips rather thin, narrow. Teeth conic, simple, upper form outer row of moderately large well spaced and somewhat caninelike teeth, especially anteriorly, where several perfected canines; inner upper teeth very small close-set continuous row, close inside outer row; lower teeth imiserial, anteriorly small and close-set, laterally larger and wide-set, like upper outer teeth; no others. Tongue depressed, free, rounded in front. Inner buccal membranes moderately broad. Nostrils small, front one about last fourth in snout; hind one nearly twice as large and midway between front one and eye. Interorbital broadly convex, with slight bony superciliary ridge each side. Preorbital width about half of eye. Preorpercle edge membraneous, very slightly fringed. Opercle ends in 2 broad spines, lower slightly more posterior.

Gill-opening forward about opposite front nostril. Gill-rakers 5+11, lanceolate, slender, long as filaments, which 1⅕ in eye. Pseudobranchiae well developed, but little shorter than gill-filaments.

Scales rather loose or caducous, in slightly oblique longitudinal rows before anal, or inclination forward; very weakly ctenoid to cycloid; basal radiating striae 11 to 15; apical denticles 10 to 13; circuli very fine; scales mostly smaller along body edges, along dorsal bases and in caudal, dorsal and anal basally; 4 or 5 scales in cheek to preopercle ridge. Lateral line slopes from shoulder till horizontal over front of anal and then on over caudal to its tip; tubes rather large, many closely trifid. Suprascapula scaled, with rather long fringe behind.

Spinous dorsal inserted midway between snout tip and fifth dorsal ray base, third spine longest and first much shortest, others graduated down. Soft dorsal inserted about midway between front eye edge and caudal base, front rays (damaged) longest, fin graduated down evidently from first rays. Spinous anal inserted at last third in space between hind eye edge and caudal base, first spine ⅕ of second, and rays graduated down from first and second which are longest. Caudal elongate (damaged), median rays evidently longest and forming most of the posterior part of fin. Pectoral small, pointed, reaches (damaged) scarcely halfway to anal. Ventral inserted opposite pectoral origin, apparently halfway to anal. Vent half an eye-diameter before anal.

Color in alcohol gray-brown on back and upper surface of head. Former with a number of narrow pale brown lines, especially distinct below spinous dorsal, and greatly inclined back, all along above lateral line. Sides and lower surface of body pale, with bright silvery-whitish sheen. Fins dull brown. Pectoral ventral and anal paler brown.

Length 162 mm.

Type.—Cat. No. 83222, U.S.N.M., northern Patagonia. Wilkes Exploring Expedition.

Only the type known.

(Named for Patagonia.)

LEPIDAPLOIS TROTTERI, new species.

Head 2¼; depth 2¼; D. XII, 10; A. III, 12; P. ii, 15; V. I, 5; scales 32 in lateral line to caudal base and 3 more on latter; 6 scales above lateral line to spinous dorsal origin, 5 above to soft dorsal origin, and 11 below to spinous anal origin; 16 scales in predorsal to occiput medianly; head width 2⅙ its length; snout 3; eye 5⅓; maxillary 2¾; interorbital 3⅗; last dorsal spine 4½; eighth dorsal ray 2⅗; third anal spine 4; eleventh anal ray 2⅗; upper caudal lobe 1⅓; least depth of caudal peduncle 2¼; pectoral 1⅔; ventral 1½.

Body ovoid, rather deep, edges convex, compressed. Caudal peduncle strongly compressed, length three-fourth its least depth.

Head conic, compressed, flattened sides about evenly approximate above and below. Snout conic, width 1⅓ its length. Eye small, elevated, hind edge about midway in head length. Mouth moderate, jaws even. Maxillary when closed reaches eye, as seen under preorbital groove reaches eye center. Four large canines in front of each jaw, median upper pair and outermost of each below, largest; inner band of low convex teeth in each jaw, narrowing behind. Lower lateral lip wide, thin, 1⅗ in eye. Nostrils separate, front one at least fourth in snout; hind one smaller, little higher, and little nearer front one than eye. Interorbital convex. Preopercle entire, sharp behind.

Gill-rakers 7+11, small, robust, lanceolate, 1⅗ in filaments, which are 1¾ in eye. Pseudobranchiae long as gill-filaments.

Scales variable, with 13 to 32 basal radiating striae, few or none extending apically and circuli very fine; head largely covered with small scales; muzzle, most all of mandible, except near articulation, and interorbital, naked; 9 rows of scales on cheek to preopercle ridge; predorsal, back and breast scales little smaller than elsewhere in trunk; smaller scales than on body extend on bases of dorsals and anals, well over each basal half of fin; caudal with basal third covered with large scales; lateral line complete, largely concurrent with dorsal profile, falls midway on caudal peduncle behind; tubes small, slightly arborescent, entire on caudal.

First dorsal spine little shorter than eye, and others graduated to last, which is longest, membranes all deeply notched marginally. Soft dorsal much shorter than spinous, though higher, last ray extending back little beyond caudal base. Anal spines graduated from first to third, which is longest, and soft anal like soft dorsal. Caudal emarginate, pointed above and below. Pectoral not reaching anal. Ventral inserted before pectoral base, extends at least as far posteriorly as pectoral tips, and spine slightly less than half length of fin.

Color in alcohol dull brown generally, each scale on trunk with bluish-gray spot, largest size of pupil, which on head form horizontal lines continuous and slightly converging to muzzle. On trunk between longitudinal rows of pale spots equally broad umber-olive lines, darker than general body-color. Bluish spots also extend in scales on bases of dorsals and anals. Blackish blotch on membranes of first to fourth dorsal spines. Below soft dorsal, and including basal two-fifths of fin, deep chocolate-brown or dusky blotch with white saddle on caudal peduncle behind, 3 or 4 scales in width, though dark area slopes attenuated down to origin of lower caudal lobe. Pectoral and caudal brown. Ventral and lower broad margin of anals deep brownish-black to blackish. Iris brown. Teeth white.

Length, 290 mm.

Type.—Cat. No. 82970, U.S.N.M., Pomotou Islands. Wilkes Exploring Expedition.

According to the original painting this specimen was captured at Sertes Island, August, 1839. It is shown as morocco-red in back and upper surface of head. Side of trunk peach-red. Side and lower surface of head, and undersurface of trunk lemon-chrome. Lips like side of head. Iris nopal red. At junctures of scales dark longitudinal streaks on back, more reddish and lilac on head and chest. Each scale on trunk with pale or whitish median spot. White blotch before and behind black dorsal blotch, very distinct, and lower also extending well down along lower caudal edge. Other black markings as described from alcoholic specimen, except bloth on dorsal spine not basal, but embraces median region of front of fin. Spinous dorsal yellow, with small, irregular, pale orange blotches. Soft dorsal more reddish and more mottled with dull red. Anal similar. Caudal greenish-yellow terminally, with more reddish tints on rays basally and about upper margin. Pectoral pale or orange.

This species is first noticed by Gunther under the mistaken identity with *Labrus macrurus* Lacépède. He had a single young example from Vavau, which he calls *Cossyphus macrurus.*[a] The other synonym nyms he includes are *Crenilabrus chabrolii* Lesson and *Cossyphus maldat* Valenciennes, both of which belong with his *C. bilunulatus*, as we have already noticed. Gunther's figure certainly represents *L. trotteri*, only differing in the minor point of a small blackish blotch at the front of the spinous dorsal. His specimen was 255 mm. long and appears to have been the only one ever obtained. Jordan and Seale credit Gunther's record as *L. hirsutus*,[a] still perpetuating Gunther's error.

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[a] Journ. Mus. Godeffroy, vol. 15, 1881, p. 240, pl. 129, Fig. A.

(For Dr. Spencer Trotter, of the chair in biology, in Swarthmore College.)

CHROMIS CUPREUS, new species.

Head, 3; depth, 2; D. XIII, 12; A. II, 12; P. ii, 18; V. I, 5; scales 21 in upper arch of lateral line, and 12 pores in horizontal section; 4 scales above lateral line to spinous dorsal origin, 3 above to soft dorsal origin, and 13 below to spinous anal origin; 36 predorsal scales; head width, $1\frac{4}{5}$ its length; fourth dorsal spine, $1\frac{4}{5}$; fifth dorsal ray, $1\frac{3}{5}$; second anal spine, 2; first anal ray, $1\frac{2}{5}$; lower caudal lobe (damaged), 1?; least depth of caudal peduncle, $2\frac{1}{3}$; pectoral, 1; ventral, $1\frac{1}{3}$; snout, $4\frac{1}{10}$ in head from upper jaw tip; eye, $3\frac{4}{5}$; maxillary, $2\frac{4}{5}$; interorbital, 3.

Body deeply ovoid, compressed, predorsal slightly trenchant, profiles alike and deepest about middle of pectoral. Caudal peduncle well compressed, length four-fifths its least depth.

Head deep, compressed, flattened sides slightly approximate below. Snout short, declivous, convex, length three-fifths its width. Eye scarcely elevated, center about first third in head. Mouth small, gape short, and lower jaw very slightly projecting. Maxillary free, reaches eye; expansion $2\frac{1}{3}$ in eye. Lips free, moderate. Teeth conic, simple, as outer row of larger more robust ones and inner narrow band of smaller ones. Nostril about last third in snout. Interorbital convex. Preopercle and preorbital edges entire. Single short strong opercular spine.

Gill-opening forward opposite nostril. Gill-rakers 9+24, lanceolate, $1\frac{3}{5}$ in gill-filaments, which $1\frac{1}{10}$ in eye. Pseudobranchiae large, three-fifths of gill-filaments.

Scales in rows parallel with lateral line, rows converging posteriorly. Smaller scales all along body edges. Small scales over all fins basally, becoming minute and more numerous over rayed fins. Muzzle, except lips, covered densely with small scales, also small scales crowded on top of head and suborbital. Cheek with 8 rows of scales, median row enlarged. Scales with 6 basal radiating striae; apical denticles 90; circuli very fine. Tubes in lateral line large, with 2 or 3 short branches above and same below, and last tube 2 scales from caudal peduncle.

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[a] Bull. Bur. Fish., vol. 25, 1905 (1906), p. 298.

Spinous dorsal inserted little behind pectoral origin, third to fifth spines longest, second spine long as last and first much shortest; fin edge notched. Soft dorsal inserted at last third between spinous dorsal origin and caudal base, depressed fin extending back little farther than latter. First anal spine not quite one-third of second, inserted slightly nearer pectoral origin than caudal base, rayed fin reaching latter as depressed backward. Caudal emarginate, lobes well pointed. Pectoral reaches opposite anal origin. Ventral inserted behind pectoral base, reaching vent, which is close to anal; spine three-fourths of fin.

Color in alcohol dark vandyke brown generally. Sides and below rich dark coppery, a pale coppery area medianly on each scale. Fins all deep brownish, except paler pectoral and front or inner edges of ventral rays, each of which are narrowly quite pale or milky. Iris brown. Axil of pectoral brown, without dark blotch.

Length 157 mm.

Type.—Cat. 83108, U.S.N.M., "Singapore, Maui, Fiji, or Samoa," though most likely from either of the two last named. Wilkes Exploring Expedition.

Only the type known, chiefly to be distinguished by its color.

(*Cupreus;* copper.)

Family DACTYLOSCOPIDAE.

GILLELLUS AUSTRALIS, new species.

Head 4¼; depth 7; D. VI–XX, 21; A. II, 38; P. 15; V. 3; scales 29+7+32 in lateral line to caudal base and 2 or 3 more on latter; 3 scales above lateral line at nearest approach to spinous dorsal; 6 scales above lateral line to soft dorsal, 6 below to anal; head width 2⅓ in its length; first dorsal spine 8¼; tenth and ray 2¼; least depth of caudal peduncle 4⅘; caudal 1⅘; pectoral 1; ventral 2⅗; snout 7 in head from upper jaw tip; eye 6⅓; maxillary 4; interorbital 2 in eye.

Body elongate, slender, deepest about end of pectoral, strongly compressed. Caudal peduncle strongly compressed, free.

Head conic, wide as deep. Snout convex over surface, length three-fifths its width. Eye superior, center at first fourth in head, long as snout. Mouth small, oblique, lower jaw well protruded. Maxillary oblique, to eye center, expansion 1⅓ in eye. Teeth in narrow bands in jaws, fine, conic, simple. No teeth on mouth roof. Lips moderate, entire. Nostrils small, superior. Interorbital level. Preopercle entire. Opercle smooth, superior hand flap with fringe of 6 short points, longest about 3 in eye.

Gill-opening forward opposite hind eye edge. No gill-rakers. Pseudobranchiae about three-fifths of gill filaments, which are 1⅓ in eye.

Scales mostly fallen, in even longitudinal rows. Caudal scaly basally, other fins naked. Head naked. Scales with 19 to 25 basal marginal striae, of which 2 to 6 are incomplete. Lateral line complete, slopes down behind depressed pectoral midway along side, arch 2¾ in horizontal section. Tubes in lateral line simple, rather large, each well exposed.

Dorsal spines all flexible. First dorsal spine inserted over middle of opercle and with succeeding 5 all separated, without membranes, and of uniform height; other dorsal spines uniform and scarcely distinguished from dorsal rays of soft fin. Anal begins little before origin of second spinous dorsal or one connected by membranes, fin edge little more notched. Caudal elongate, median rays longest and forming point behind. Pectoral large, pointed. Ventral inserted before first spinous dorsal, reaches anal.

Color in alcohol pale brownish, evidently little paler below. Back and upper surface of head finely specked with obscure brown dots or small blotches, these also on dorsals and caudal. Along back traces of about 12 small dark-edged saddles. Two pale lines extend from eye, one backward and other more inclined in same direction.

Length 87 mm.

Type—Cat. No. 83315, U.S.N.M., Valparaiso, Chile. Wilkes Exploring Expedition.

Also Cat. No. 83099, U.S.N.M., paratype, same data. It shows: Head 4¼; depth 7; D. VI–XX, 22; A. II, 39; scales 33+6+31 in lateral line to caudal base and 2 more in latter; snout 7⅓ in head from upper jaw tip; eye 6¼; maxillary 3⅔; head width 2¾; length 68 mm.

This species is related to *G. semicinctus* Gilbert, from the Gulf of California and Florida, but differs in its more slender body and increased scales and fin rays. Probably *Dactyloscopus zelotes* Jordan and Evermann is also a *Gillellus*, as it is described with "dorsal beginning in the nape, its distance from snout about equaling depth of body, the first 6 rays shorter than those following and not connected by membrane; as no traces of articulation can be found, they are probably flexible spines, but are not clearly differentiated from those immediately following." As *D. zelotes* has been set aside as the type for the nominal subgenus *Esloscopus* Jordan and Evermann, probably the latter had best be merged with *Gillellus* rather than with *Dactyloscopus*.

(*Australis*, southern.)

SALARIAS McCULLOCHI, new species.

Head $4\frac{2}{5}$; depth $4\frac{2}{5}$; D. XIII, 23; A. 23; P. 14; V. 2; snout $3\frac{1}{3}$ in head; eye $4\frac{1}{3}$; maxillary $2\frac{1}{2}$; interorbital $5\frac{1}{5}$; first dorsal spine $1\frac{2}{3}$; fifth dorsal ray $1\frac{1}{2}$; fourth anal ray $2\frac{1}{5}$; least depth of caudal peduncle $2\frac{1}{2}$; caudal $1\frac{1}{10}$; pectoral 1; ventral $1\frac{4}{5}$; head with $1\frac{1}{2}$.

Body slender, elongate, strongly compressed, deepest at middle of depressed pectoral. Caudal peduncle strongly compressed, not free above.

Head small, sides and cheeks little swollen and lateral surfaces more convergent above. Snout very obtuse, front profile nearly vertical, surface broadly convex, length two-thirds its width opposite front of eyes. Eyes moderate, well elevated anteriorly, center near first fourth in head. Mouth broad, gape short, moderately inferior or front of lower jaw at least slightly before eye. Maxillary extends back far as hind eye edge. Upper lip crenulate and lower entire. Teeth fine, movable in lips, even, close set, incisor like. No lower canines. Nostril with small flap, about one-fourth of eye, situated slightly above lower eye edge.

Gill-opening with broad free fold across isthmus. Gill-rakers 3+10? short weak points barely one-fifth of filaments, which equal eye. Pseudobranchiae about two-thirds of gill-filaments.

Skin smooth. No crest or nuchal filaments. Palmate supraorbital tentacle half diameter of eye in length. Row of pores over suborbital and close behind eye, and another down along preopercle. Lateral line declivous over end of depressed pectoral, then obsolete.

Spinous dorsal origin slightly before hind edge of gill-opening, spines uniformly high forward, few of last ones graduated down. Soft dorsal origin little nearer caudal base than snout tip; fin uniformly high and last ray joined with caudal by low membrane.

Color in alcohol dull brownish generally, under surfaces greatly paler or with tints of dull water green. Dull buff band from front surface of snout across preorbital, lower side of head, including upper front pectoral base, then midway along side to caudal base medially. Obscure narrow buff-brown line parallel along and including lateral line. Fins all dull brown.

Length 90 mm.

Type.—Cat. No. 83293, U.S.N.M., Billinghausen Island. Wilkes Exploring Expedition.

Only the above specimen known. It differs strikingly from the other Polynesian species in its coloration, the median lateral yellowish longitudinal band appearing very pronounced.

(Dedicated to Dr. Allan R. McCulloch the accomplished zoologist of the Australian Museum.)

XYSTREURYS RIBEIROI, new species.

Head 3⅖; depth, 2⅓; D. 77; A. 57; P. i, 9; V. i, 5; about 92 tubes in lateral line to caudal base; scales 103 in lateral line to caudal base; 36 scales above lateral line, 40 below; longest dorsal ray 2⅕ in head; longest anal ray 2⅓; least depth of caudal peduncle 2⅗; right pectoral 3; left pectoral 2⅕; caudal 1⅕; head width 4⅔; snout 4⅕ in head, from upper jaw tip to upper eye; upper eye 6¼; maxillary 2$\frac{1}{10}$.

Body strongly compressed, contour ellipsoid or greatest depth median in its length. Caudal peduncle strongly compressed, length about two-fifths its least depth.

Head greatly compressed, upper profile slightly concave above eye. Snout convex over surface and in profile, length 1⅕ its width. Lower eye but slightly advanced from upper, hind edge about first two-fifths in head. Maxillary very oblique, reaches opposite hind pupil edge; expansion 1½ in lower eye. Mouth large, gape curved, and lower jaw well protruded. Row of strong conic teeth in each jaw, several anteriorly largest and little canine like; no teeth on mouth roof. Front (left) nostril at last two-fifths in snout; hind one well separated, opposite front eye edge. Interorbital narrow, width half upper eye diameter.

Gill-opening forward about opposite hind pupil edge. Gill-rakers 3+15, lanceolate, 1¼ in filaments, which are 1¼ in eye. Pseudobranchiae two-thirds of gill-filaments.

Scales in rather even longitudinal rows. Dorsal, anal, pectoral and ventral scaleless, and caudal largely covered with small scales. Head, except jaws and snout, scaly. Cheek with 14 rows of scales from lower eye edge to angle of preopercle ridge. Maxillary scaly. Scales cycloid; basal radiating striae 24 or 25 on left or colored side, and 20 or 21 on blind side; lateral line begins below lower eye, then curves upward and back to shoulder on head; arch 3⅗ in straight section; moderate tubes simple.

Dorsal begins on snout, opposite front of lower eye. Anal begins opposite pectoral origin. Caudal with median rays longest, forming median obtuse point behind. Pectoral small, pointed. Ventral inserted about opposite hind preopercle edge.

Color in alcohol mummy-brown on left side, and fins similar. Right side paler to olive-gray.

Length 202 mm.

Type.—Cat. No. 83404, U.S.N.M., Rio Janeiro. Wilkes Exploring Expedition.

Also Cat. No. 83399, U.S.N.M. No locality, though doubtless from Rio Janeiro. Wilkes Exploring Expedition. It shows: Head 3⅗; depth 1½; D. 76; A. 54; scales 102 in lateral line to caudal base; about 95 tubes in lateral line to caudal base; 32 scales above lateral line, 85 below; snout 4¾ in head from upper jaw tip; upper eye 4½; maxillary 2. Gill-rakers 4+14. Scales with 18 basal striae. Length 148 mm.

This species differs from *X. notatus* (Berg) in its fewer anal rays, finer scales, larger head, maxillary reaching hind pupil edge, and more gill-rakers. According to Ribeiro the A. 64 to 67, scales 82 to 86, head 4, gill-rakers 6+11.

(For Alipo de Miranda Ribeiro, author of Fauna Brasiliense, which we have found of great value in our studies of the Brazilian fishes obtained by the United States Exploring Expedition.)

ON THE TAXONOMY, BIOLOGY, AND DISTRIBUTION OF THE BITING LICE OF THE FAMILY GYROPIDAE.

By H. E. Ewing,

Of the Bureau of Entomology, United States Department of Agriculture.

INTRODUCTION.

The family Gyropidae is a small family of biting lice that for many years included but the single genus *Gyropus* Nitzsch and its two species, the two common biting lice of the guinea pig. Later other species were added to this genus, and in 1910, Mjöberg, in his extended studies on the Mallophaga and Anoplura, divided it, erecting the new genus *Gliricola* for the slender species of the guinea pig. Mjöberg was the first to give any good account of the mouth-parts and certain important external characters of these lice, yet he made no attempt to allocate the described species to the two genera, which he recognized.

In 1912 Neumann gave the first and, up to the present, the only comprehensive account of the contained species. He recognized the group as a whole as constituting only the single genus *Gyropus* Nitzsch, Mjörberg's paper apparently being overlooked. Neumann was the first to possess an abundance of material, and for this reason his work is very valuable. He added five new species and one new subspecies to the group and gave, among other things, a key to most of the described species.

Recently the present writer has had the opportunity of examining a large collection of rodent and other mammal skins brought fresh from South America by Dr. Alexander Wetmore, of the Bureau of Biological Survey. These skins were taken during 1920 and 1921 in Argentina, Paraguay, and Uruguay. There were about 150 of them, and each had its accession number. Those that are mentioned in the present paper have been determined to genera for the writer by A. H. Howell, of the Bureau of Biological Survey. From the collections made from these fresh skins others were added from old museum skins in the United States National Museum, which had been previously determined to species. With this abundance of material, to which should be added the specimens of the division of insects of the United States National Museum, the writer seemed justified in undertaking the preparation of a review of the whole family. The paper here presented, while falling far short of a monographic attempt, does give, it is believed, a fairly adequate survey of the family as a whole.

To the 14 valid species recognized by Harrison (1916) in his catalogue of the Mallophaga as belonging to the family Gyropidae, there are here added 12 more; while the number of genera in the family is here increased from 2 to 9. Certainly only a small percentage of the species of the family is represented by these 26 species.

In the preparation of this paper assistance has been rendered by various persons. The writer wishes to acknowledge his indebtedness, first to Dr. Alexander Wetmore, of the Bureau of Biological Survey, who made the collection of the fresh mammal skins examined, also to Dr. H. H. T. Jackson, of the Bureau of Biological Survey. Gerrit S. Miller, jr., curator of the division of mammals, of the United States National Museum, very kindly granted the writer permission to examine many mammal skins in the division collections, and H. H. Shamel rendered much assistance in many ways during the collection of specimens from the dried museum skins. Lastly the writer is indebted to Mrs. Nettie Klopfer, of the Bureau of Entomology, United States Department of Agriculture, for aid in mounting specimens on microscope slides.

FAMILY CHARACTERS.

Probably no family of the order Mallophaga is so clearly marked off from the others as the family Gyropidae; however, the present writer has found at least three unusual species which help bridge over, to a certain degree, the gap between the one-clawed, mammal-infesting *Amblycera* and the other two-clawed species which infest both mammals and birds.

Formerly the family was differentiated from all others in its suborder in having but a single claw to each tarsus and some of the legs circular (hence the name *Gyropus*). This assumption of a circular shape by the legs is the result, as I have found by observing living specimens, of their adaptation for hair clasping. The writer now finds that there are two new species to be added which have two claws to each front tarsus and one new species with none of the legs circular and adapted for hair clasping. These finds will necessitate somewhat a revision of the family characters.

As now constituted the family Gyropidae may be characterized as including all those Amblyceran Mallophaga which have but a single claw on each leg of the two posterior pairs, and, with but a single exception, some of the legs modified into hair claspers; the palpi either two, three, or four segmented; the antennae four-segmented, but frequently appearing three-segmented; the head with broad deep antennal fossae and the temporal region rounded.

HABITS.

Observations on habits were confined to the two species, *Gyropus ovalis* Nitzsch and *Gliricola porcelli* (Linnaeus), occurring on the guinea pig. A young, white guinea pig, infested with both these species was obtained and by constant handling and training was brought to such a state of confidence and contentment that it would rest on the stage of a binocular microscope for long periods while observations were being made on the louse species it harbored. The white hair greatly aided both in locating and in following the lice through the fur. During this process the fur would be parted repeatedly by the use of a comb or forceps. Lice also were removed both with and without some of the hairs of the host for observation with the higher powers of the compound microscope.

Food.—No definite conclusion could be drawn from the observations made on food habits. That the food of both these species consists in part of cutaneous secretions and excretions and in the case of *G. porcelli* of serum in addition, is indicated by several observations. First, it was noticed that both louse species remained practically all the time next to the skin. Notwithstanding the guinea pig was heavily infested with lice, the latter were seldom noticed except when the fur was parted. Again, a combing with a fine-toothed comb, such as is used to remove the head lice of man, only brought to the surface two individuals. When observed resting both species of lice held their heads against the skin of the host. Further, the eggs were invariably laid at the bases of the hairs, and almost always only a single one to a hair.

Mjöberg was the first one to demonstrate in *G. porcelli* a type of lancing mouth parts. The lancing or sticking apparatus was no other than the outer hypopharyngeal chitinization. In a related species this chitinization (fig. 14) is provided with two anterior, divergent horns which are not armed, but in *G. porcelli* they are armed (fig. 15) with minute serrations on their inner margins and teeth at their tips. Mjöberg observed that these horns were drawn back and forth and outward by the action of muscles attached to the posterior tendon. I have confirmed his observation by noting the action of the mouth parts in live specimens.

It is very probable that *G. porcelli* used this cutting or piercing hypopharyngeal apparatus by thrusting it into the mouth of a hair follicle then drawing the horns sidewise and cutting or abrading the skin. I have never observed this species resting with its body against the skin. It always clasps a hair, and when coming to the skin thrusts its head to the opening of a hair follicle, holding the hair, clasped all the time with the second and third pairs of legs. The products of the oil glands, which open through the mouths of the hair follicles probably also constitute an important item in the diet of this species. A heavy infestation with this louse apparently causes the hairs to become brittle.

No evidence was found indicating that the hairs of the host were eaten or used in any way for food. Specimens mounted on slides, as well as live ones, showed the stomach to be free from any solid bits of hairs. Also, hairs removed from areas of greatest infestation and examined microscopically each showed a normal, tapering tip and no marks of mandibles or mechanical injury in any way. Bird-infesting Mallophaga feed to a considerable extent on the horny, cutaneous growths of the host; in fact, one injurious species is known as the "depluming louse" because it literally eats up most of the feathers on certain heavily infested areas of the host's skin. With the mammal-infesting species it is different, and in the case of the two Gyropid species of the guinea pig no evidence whatever was found indicating that the hairs of the host were used as food.

It is possible that Gyropids feed to a certain extent upon the blood of the host, yet the skin of a heavily infested guinea pig usually does not show any abrasions. Species of *Gliricola* with their sticking or cutting apparatus probably feed chiefly, as already stated, on serum as no blood was observed in the bodies of any of the lice of this genus.

Locomotion.—Most of the Gyropidae have each of the legs of the last two pairs modified into a hair-clasping apparatus (fig. 1). The second segment of the tarsus has become greatly lengthened, transversely striated and together with the reduced true tarsal claw, formed into a large, clawlike member which, when the leg is completely flexed, fits into a bootjack type of tenaculum at the base of the femur. This forked tenaculum is striated to match the tarsus, so that, as I have observed in living specimens of *G. ovalis*, when the latter is pressed between the forks it is held locked. I have observed that when individuals are at rest that they "cast anchor" by locking at least one of the hair-clapsing legs about a hair. Through the binoculars I have studied the locomotion of *G. ovalis* and find that it usually clasps during walking movements at least two hairs. The last two legs on a side work together, usually as the fingers on a single hand, but independently of the opposite legs of the same pairs. *G. ovalis* never walks backward and, on a smooth surface, is practically helpless.

In *Gliricola porcelli* and a few other species the tarsi are greatly reduced and the tarsal claws are wanting. In this species the hair-clasping device again consists of the modified last two pairs of legs, but the modification is entirely different from that in *Gyropus*. The last two pairs of legs have their tibiae and femora curved and transversely striated, and by means of the legs on one side opposing those on the other side, individuals were observed to clasp the larger hairs of their host. When small hairs are clasped the tibia itself functions as a large claw and holds the hair tightly by means of pressure against the femur. By observing individuals under the binoculars they could be seen to move rapidly either up or down a hair, and with some hesitancy from one hair to another. *G. ovalis*, on the other hand, works itself with ease across the hairs of its host. With *G. porcelli* locomotion takes place either forward or backward, and with almost equal facility, but not sideways. They can crawl either way on a smooth glass surface. This species has so adapted itself to resting and crawling on a single hair that we observe not only its remarkable slimness of body but also a median groove, " hair furrow," on the ventral side of the abdomen.

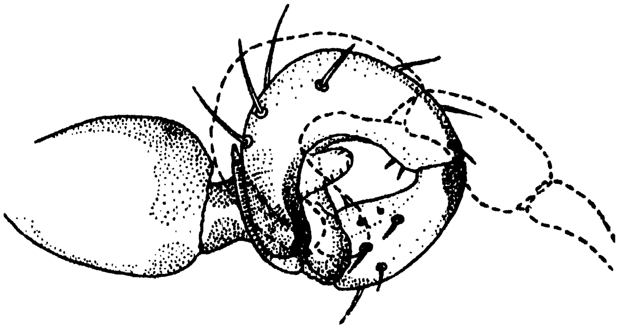

FIG. 1.—MONOGYROPUS LONGUS. LEG II SHOWING TARSUS LOCKED IN THE FURROWED CROTCH OF FEMORAL TENACULUM. DOTTED LINES SHOW POSITION OF LEG WHEN EXTENDED.

Response to temperature.—Clips of hairs infested with *G. porcelli* were taken and placed in watch glasses. In a few minutes the lice became restless and in less than an hour all had left the hair tufts. When these wandering individuals were placed again on the guinea pig they immediately, without exception, scrambled between the hairs and went down next to the skin of the host. Was this a response to the animal heat of the host?

The fact that the lice on the guinea pig remain so constantly next to or near the skin indicates again that the warmth of the body attracts them, yet we are not warranted in concluding that this is the case without a demonstration under experimentally controlled conditions.

Mating.—A broad individual which was taken to be a specimen of *Gyropus ovalis* was observed on a guinea pig and removed with a tuft of hair for observation under the binocular microscope. It proved to be a large female specimen of *G porcelli* with two males holding on to her. One male was on each side, and both of them were clasping the female with the two posterior pairs of legs. The female was apparently but little inconvenienced by her heavy load and moved easily about up and down the hairs.

One of these males was observed in an unsuccessful attempt to mate with the female. The genitalia with its ejaculatory sac was protruded and held extended for a few seconds, but no connections being made, was easily and quickly withdrawn.

What appeared to be a normal mating was observed through the binoculars on the host itself. The male clasped the abdomen of the female with his two posterior legs from below, holding himself under the female and his head under her thorax. In this position he interfered very little with the locomotion and general activities of the female, she packing him with facility as she crawled about in the fur of the host.

DESCRIPTIONS OF SUBFAMILIES, GENERA AND SPECIES.

In the following pages descriptions are given of the three subfamilies and nine genera, which the writer recognizes as belonging to the family, and of all the species represented in the combined Washington collections. Mention is made also of the known remaining species, and they are in nearly every case given in the keys.

KEY TO SUBFAMILIES AND GENERA.

a^1. Palpi composed of three segments; tarsi normal------**PROTOGYROPINAE.**
Contains but one genus---------------------------**Protogyropus**, new genus.

a^2. Palpi two, or four segmented; at least one of the two posterior pairs of legs modified so that each leg of a pair forms a hair-clasping apparatus.

b^1. Palpi four segmented; second tarsal segment of second, and sometimes the third pair, of legs much enlarged, clawlike and transversely striate; femora of same legs each with a large, posterior, basal protuberance which is forked and transversely striated for the reception of tarsus--**GYROPINAE.**

c^1. Tarsus I provided with a single claw.

d^1. Femur of leg III without forked and striated tenaculum for holding tarcus; second segment of tarsus III not transversely striate---------------------------**Monogyropus**, new genus.

d^2. Femur of leg III with tenaculum and tarsus III transversely striate.

e^1. Most of abdominal segments provided dorsally with one or two transverse rows of subequal setae.

f^1. Typically each abdominal segment with two transverse rows of dorsal setae----------------**Gyropus** Nitzch.

f^2. Typically each abdominal segment with a single transverse row of dorsal setae----**Allogyropus**, new genus.

e^2. Abdomen with but few setae above, some of which are large and in longitudinal rows, four such rows are always present-------------------- **Tetragyropus**, new genus.

c^2. Tarsus I provided with two claws.

d^1. Tibia I swollen on its inside near its tip into a more or less thumblike tubercle; tarsus I with first and second segments about equal-------------------------- **Macrogyropus**, new genus.

d^2. Tibia I not swollen into any thumblike tubercle near its tip; tarsus I with segment I twice as broad as long and about half as long as segment II--------------- **Heterogyropus**, new genus.

b^2. Palpi two segmented; second tarsal segment of second and third legs never clawlike, femur of same legs not provided with any forked tenaculum-- **GLIRICOLINAE.**

c^1. Anterior horns of hypopharyngeal chitinization unarmed. **Paragliricola**, new genus.

c^2 Anterior horns of hypopharyngeal chitinization each armed with a row of teeth at its tip------------------------- **Gliricola** Mjöberg.

PROTOGYROPINAE, new subfamily.

The new subfamily here established is for a new genus, and is distinct from the other two subfamilies which the writer would recognize, in having three segments to the palpi and in having all the legs normal, *i. e.* adapted for locomotion only. The large hair-clasping legs of the second and third pairs found in so many of the members of the Gyropidae are in this subfamily simple and in no way modified for hair clasping.

It is desired that the palpi of all species of the family be carefully studied. Of those species observed by the writer all, except the one going into this new subfamily, appear to have either two, or four segmented palpi.

But a single genus included.

PROTOGYROPUS, new genus.

Head somewhat triangular in shape, without projecting temporal lobes. Prothorax broad, being almost as broad as the head and mesothorax. Tarsi all very similar, first segment broader than long and swollen on inner distal margin; second segment longer than broad; claw simple, strongly curved near the base and sharp at apex. Femora unarmed, simple, strongly curved on outer margin. Dorsal setae of abdomen for the most part arranged into four longitudinal rows; large lateral setae present on certain segments.

Genotype and its host.—*Protogyropus normalis*, new species, from *Cavia*, species, taken in Argentina.

This genus, based on a single species, is of special interest because of its evident primitive character as shown by the legs which have not developed special hair-clasping devices.

PROTOGYROPUS NORMALIS, new species.

Plate 1, fig. 1, and text figs. 2 and 3.

A medium-sized, rather poorly chitinized species. Head moderate, subtriangular; temporal lobes not projecting; antennal fossae fully one-half as long as head. Antennae rather short. Palpi (fig. 2) almost half as long as antennae; first segment ringlike and much broader than long, second segment equal to first in length but not so broad, distal segment slightly longer than two but only two-thirds as broad. Dorsally the head is sparsely clothed with setae including a posterior, transverse row of six long ones and two long setae on each temporal angle. Prothorax about three-fourths as broad as head and broadest near its anterior margin. Mesothorax more or less fused with metothorax, broader than prothorax and about twice as broad as long. Metathorax the broadest and largest thoracic segment, clothed above by a few setae which are mostly a continuation of the four longitudinal rows of the abdomen. Abdomen oval, broadest at the region of the fourth segment. Dorsally the abdomen bears four longitudinal rows of moderate setae, usually there being in each row three setae to a segment, these three setae increasing in length from before backward. The last two abdominal segments each bear a pair of large lateral setae. Legs moderate and similar, the first pair being smaller than the other two pairs. Tarsus I similar to the others, first segment rather indistinctly divided from the second which is longer and narrower than the first, claw slightly longer than segment two.

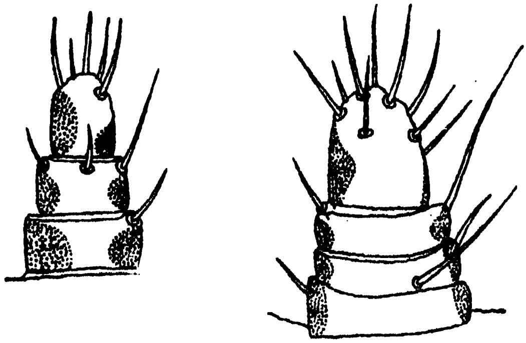

Fig. 2.—To left, palpus of Protogyropus normalis; to right, palpus of Heterogyropus heteronychus.

Length, 1.02 mm.; width, 0.52 mm.

Type host and type locality.—Host *Cavia*, species (U.S.N.M. 236337: Biol. Surv. Collection) from Gen. Roca, Rio Negro, Argentina.

Type slide.—Cat. No. 23747, U.S.N.M.

Described from the following material: Three females from a skin of a female *Cavia*, species, (Cat. No. 236337 U.S.N.M.: Biol. Surv. Collection) taken November 23, 1920, at Gen. Roca, Rio Negro, Argentina, by A. Wetmore; two females from skin of female *Cavia*, species (Cat. No. 23640, U.S.N.M.: Biol. Surv. Collection) taken

November 26, 1920, at the same place by A. Wetmore; and one female from skin of male *Oryzomys*, species (Cat. No. 236273, U.S.N.M. Biol. Surv. Collection) taken November 7, 1920, fifteen miles south of Cape San Antonio, Province of Buenos Aires, Argentina, by A. Wetmore. The last record is probably that of a straggler.

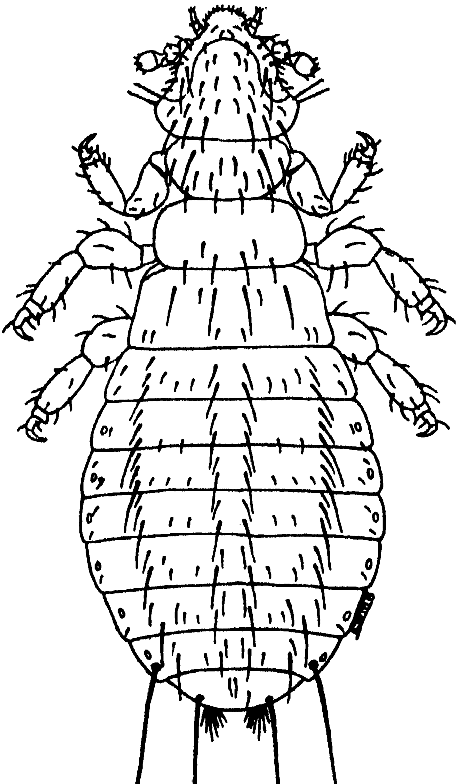

FIG. 3.—PROTOGYROPUS NORMALIS. DORSAL VIEW OF FEMALE, × 90.

GYROPINAE, new subfamily.

Species going into the old genus *Gyropus* Nitzsch are so diverse and widely distributed according to host species that they should be placed into several genera. Hence this old genus is here split into five genera, and there has been added also a new genus for a peculiar species which has the anterior tarsi two-clawed.

The subfamily *Gyropinae* is separated from the subfamily *Protogyropinae* by the characters already given in the diagnosis of the latter family. It is at once separated from the other subfamily to be here established by always having the legs of the second and usually having the legs of the third pair, each modified so as to form a hair-clasping structure (fig. 1). This modification consists of an elongation and transverse striation of the second segment of the tarsus, which, together with the small terminal tarsal claw, forms a large clawlike structure adapted for fitting into a "bootjack" type of tenaculum on the femur. This femoral tenaculum is formed by a large divided tubercle at the base of the femur and is striate, or furrowed, in the same manner as the second segment of the tarsus. The *Gyropinae* are broad, stout lice and sometimes show a sexual dimorphism.

Contained genera.—*Gyropus* Nitzsch and five new genera to be here erected.

MONOGYROPUS, new genus.

Tarsus I provided with a single claw. Femur II provided with a forked and furrowed tenaculum for holding tarsus; femur III normal. Tarsus II with second segment greatly elongated and transversely furrowed and with the claw proper, which is greatly reduced, forming a clawlike structure adapted for fitting into femoral tenaculum; tarsus III with second segment clawlike but smaller and without transverse furrows. Tibia I without a row of toothlike setae on a swollen or thumb-like expansion at the inner distal margin. Abdomen elongate, typically each segment with two transverse rows of setae. Sexual dimorphism somewhat marked.

Genotype and host species.—Gyropus longus Neumann from *Abrocoma bennetti.*

Apparently only two species, the genotype and a new species, are included in this genus which is quite distinct on account of the peculiar nature of the last pair of legs. The genital armature of the male is usually large and well chitinized, with an expansive basal plate and strong parameres.

KEY TO THE SPECIES OF MONOGYROPUS.

a.^{1} **Body subrectangular; sides of abdomen almost parallel; total length over 1¾ mm. ________________ M. longus** (Neumann).

a.^{2} **Body oval; abdomen swollen; total length not over 1½ mm.**

M. parvus, new species.

MONOGYROPUS LONGUS (Neumann).

Text figs. 1 and 4.

A long, medium-sized, fairly well chitinized species. Head broad for such a long species; temporal lobes slightly projecting and at their angles bearing a tuft of setae; antennal fossae deep, more deeply notched on their ventral than on their dorsal margins; antennae of the usual shape being almost capitate. Above, the head is sparsely clothed with setae, including a posterior row of four which are much longer than the others. Prothorax in the female almost as broad as the head and with straight, parallel sides toward the front while toward the rear the sides converge rapidly; above, the prothorax is provided with several long setae, including two transverse rows of four each. In the male, prothorax shorter and on each side armed with a pair of stout, toothlike spines. Mesothorax not so broad as prothorax, and constituting the narrowest part of the body. Metathorax large, shaped like a truncated cone. The abdomen in the female much longer than the head and thorax combined; in the male about as long. In the female the sides of the abdomen are frequently subparallel, but in the male are more swollen. The abdomen is well clothed with long, stout setae. Genital armature of male large and heavily chitinized, basal plate shield-shape, parameres shaped like a pair of mandibles. Each pair of legs differently formed as is characteristic of the genus. Claw of tarsus I the largest, of tarsus II the smallest; claw of the last tarsus (fig. 4) about twice as long as claw of tarsus II. Tip of tibia III (fig. 4) provided with stout, flattened spines at its apex and below with an oblique row of three long spines. Femur II (fig. 1) semicircular, with a very large tenaculum, which is one-lobed in front and two-lobed behind.

Length of female, 1.67 mm.; width, 0.49 mm. Length of male, 1.54 mm.; width, 0.55 mm.

Type host and type locality.—Harrison (1916) gave *Abrocoma bennetti* as the type host of this species, notwithstanding the type specimen had not been selected. The specimen which Neumann had from *Abrocoma bennetti* is here designated as type, which designation should fix this host as the type host. The host was taken in Chile.

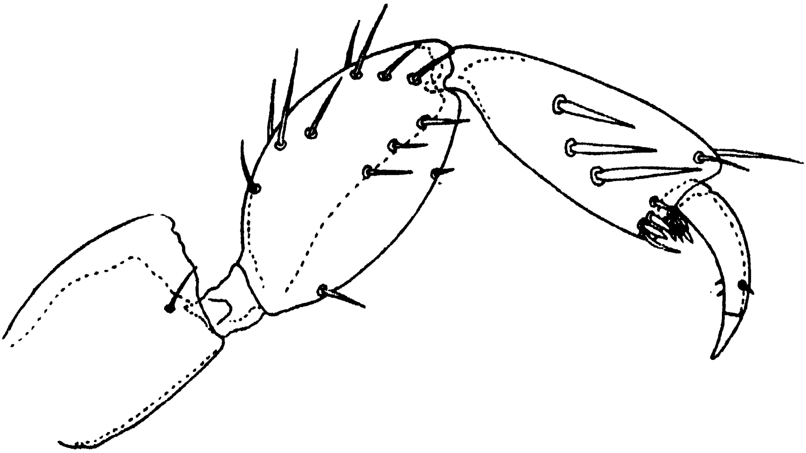

FIG. 4.—MONOGYROPUS LONGUS. LEFT POSTERIOR LEG FROM BELOW.

Described from a large number of specimens mounted on four slides and determined originally by Paine as *Gyropus longus* Neumann. They were taken on *Abrocoma* from Valenar, Chile, by Porter. Neumann based his original description on a large number of specimens, for the most part females taken on "Ratones" at Peñaflor, Chile, by Porter and a single female from *Abrocoma bennetti*, Chile, by Trouessart.

MONOGYROPUS PARVUS new species.

Text fig. 5.

A small, pale louse. Head very broad, broader than long, with a transverse row of six very large dorsal setae on the temporal region. Antennae of the usual type, each about filling its fossa, last segment a little more than half of a sphere, which is completed by the dilated part of segment III. Palpi moderate, last segment almost twice as long as next to last. Prothorax about three-fourths as broad as head, much broader than long and irregular in outline. Mesothorax shorter and narrower than the prothorax and representing the narrowest region of the body. Metathorax about as long as pro- and mesothorax combined, shaped like a truncated cone. Abdomen slightly swollen and moderately well clothed with flattened setae. Male genital armature (fig. 5) conspicuous; basal plate, long and pedicel-like; parameres (?). From near the apex of basal plate arise four pairs of very long, slender, curved seta-like structures which extend beyond the margin of the armature proper. Three pairs of legs differing as they do in the genus. Tibia II strongly arched on the outside and broadest at its middle; tibia III similar to tibia I, being broadest at its distal end. Tarsal claw I almost straight and sharp at its apex; tarsal claw II exceedingly short and minute, but very sharp; tarsal claw III fully twice as long as two, slender, but slightly curved, and also exceedingly sharp. Femoral tenaculum moderate but with a very deep fork, or crotch.

Length, 1.29 mm.; width, 0.48 mm.

Type host and type locality.—*Ctenomys colburni* from Huanuluan, Rio Negro, Argentina.

Type slide.—Cat. No. 23748, U.S.N.M.

Description based on the type, a male specimen from a female skin of *Ctenomys colburni* (Cat. No. 238122, U.S.N.M.) taken from Huanuluan, Rio Negro, Argentina. Another male specimen, taken from a skin of *Ctenomys sericeus*, male (Cat. No. 84192, U.S.N.M.), collected at Rio Chico, Santa Cruz, Argentina, appears to differ in no specific respect from the type.

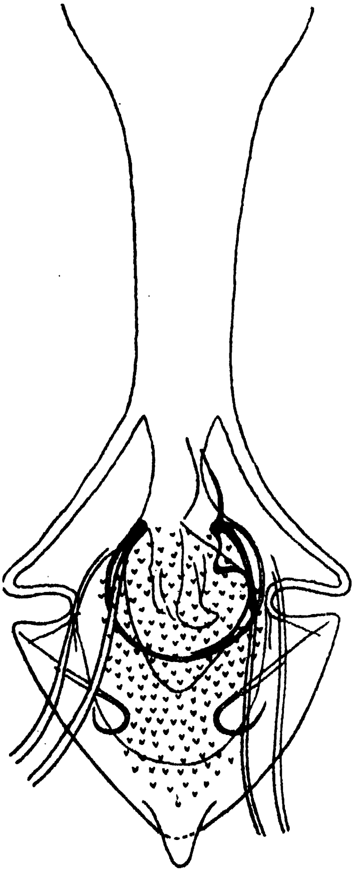

FIG. 5.—MONOGYROPUS PARVUS. COPULATORY APPARATUS OF MALE.

Genus GYROPUS Nitzsch.

Head broad and very deeply notched in front of temples. Tarsus I provided with a single claw. Femur II and III each provided with a forked and furrowed tenaculum for holding tarsus. Tarsus II and III each with second segment greatly elongated and transversely furrowed and with the claw proper, which is greatly reduced, forming a clawlike structure adapted for fitting into femoral tenaculum. Tibia I without a row of toothlike setae on a swollen or thumb-like expansion at the inner distal margin. Abdomen oval, typically each segment with two transverse rows of setae. Sexual dimorphism sometimes marked in case of male which has the first segment of tarsus I produced inwardly and formed into a thumb which with the accompanying claw forms a pair of claspers.

Genotype and its host species.—*Gyropus ovalis* Nitzsch from *Cavia cobaya* (guinea-pig).

In this genus are included seven species of the subfamily *Gyropinae*. Three of these, *G. ovalis* Nitzsch, *G. forficulatus* Neumann, and *G. alpinus* Kellogg and Nakayama have been described, the other four are new.

KEY TO THE SPECIES OF GYROPUS EXAMINED BY THE WRITER.

a.^{1} Dorsal setae of abdomen minute, not over one-fourth as long as the segments on which they are situated..........**G. ovalis** Nitzsch.

a.^{2} Dorsal setae of abdomen large, about as long as or even longer that the segments on which they are situated.

  b.^{1} Second and third pairs of legs essentially the same; tenaculum of leg III with a conspicuous tuberclelike lobe; tibia III from two to three times as long as broad.

    c.^{1} Tarsal thumb of male longer than the width of the segment it is a part of, but slightly curved and but little broader at its middle than at its tip..........**G. forficulatus** Neumann.

    c.^{2} Tarsal thumb of male not longer than the width of the segment it is a part of, strongly curved and much broader at the middle than at the tip.

      d.^{1} Tarsal thumb of male not as broad at its middle as at its base, moderately curved; a conspicuous chitinized penis present.
G. pollicaris, new species.

      d.^{2} Tarsal thumb of male as broad at its middle as at its base and strongly curved; penis wanting..**G. latipollicaris**, new species.

  b.^{2} Third pair of legs more slender than the second, with femoral tenaculum greatly reduced and tuberclelike lobe small; tibia of leg III at least four times as long as broad; tarsal claw of leg III longer and sharper than the claw of leg II.

    c.^{1} Abdomen fully twice as long as broad and with sides subparallel.
G. gracilipes, new species.

    c.^{2} Abdomen about one and a half times as long as broad, and oval.
G. wetmorei, new species.

GYROPUS OVALIS Nitzsch.

Text fig. 6.

A medium-sized, short, oval species. Head (fig. 6) very broad; temporal lobes large and projecting, with a tuft of three or four setae at each angle. Antennae capitate, last segment spherical and with a small sensory pit; antennal fossae deep and pronounced, the lower margin projecting beyond the upper and not so deeply notched. Near the posterior margin of the head is a transverse row of about 20 short dorsal setae. Slightly posterior of each temporal angle is a large seta, the largest on the head. Prothorax about two-thirds as broad as head and subdiamond-shaped, the lateral corners being rounded. Mesothorax fully twice as broad as long and intermediate in width between the head and prothorax. Metathorax broader than long, about as broad as head, and broadest at posterior margin. Abdomen almost twice as broad as long, the eight segments of almost equal length. Each of the first six segments of the abdomen with two transverse rows of small, subequal setae, the number of setae in the posterior row being approximately twice that of the anterior row; seventh segment with the two transverse rows of dorsal setae, but their number is approximately equal in the two rows; last segment without transverse rows of setae but with two pairs of very long terminal setae. A single large pair of lateral setae to each abdominal segment. They increase in length with the backward sequence of segments. Gonopods semicircular in outline and scooplike and not as they are usually figured; each extends dorsally and inward, the inner dorsal margins extending beyond the posterior end of segment VIII. Each gonopod has its rim fringed with about a dozen setae; the two most ventral are minute, as also are the two most dorsal, while the intervening setae are large and increase in length toward the middle. Gential armature of male

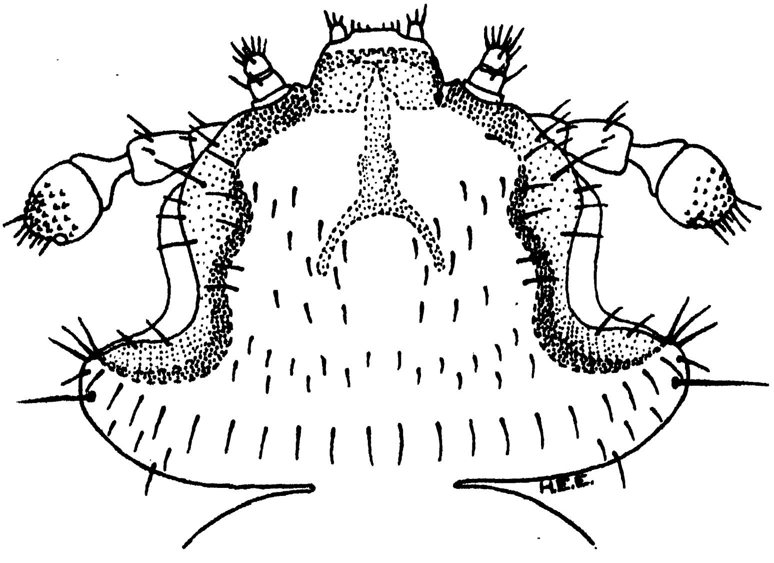

FIG. 6.—GYROPUS OVALIS. DORSAL VIEW OF HEAD.

compact and heavily chitinized; basal plate very long with straight, parallel sides; parameres clawlike, being outwardly hooked. Second and third pairs of legs practically identical; anterior fork of a femoral tenaculum simple, except for transverse striations, but posterior fork with a conspicuous, sharp, seta-bearing tubercle.

Length of female, 1.03 mm.; width, 0.52 mm. Length of male, 0.90 mm.; width, 0.35 mm.

Type host and type locality.—*Cavia cobaya* probably living under conditions of domestication.

Described from an abundance of material from various hosts. This species has followed its type host through the process of domestication and probably to all civilized countries of the world, but in nature is restricted with its host to the neotropical region. Records from hosts living in a natural state are here given. A male and female combed from a *Cavia* skin (Cat. No. 236344, U.S.N.M.: Biol. Surv. Collection) taken at Las Palmas, Chaco, Argentina, August 1, 1920, by A. Wetmore; several specimens representing both sexes from skin of *Cavia tschudi pallidior* male (Cat. No. 221015, U.S.N.M.), taken originally at Arequipa, Peru, by W. E. Castle; one female from a dragon fly (*Ischnogomphus jessei* Williamson) taken at Crestalina, Colombia, February 15, 1917, by J. H. and E. B. Williamson (Dr. W. M. Mann has published an article on the finding of this and other specimens of the same species on this dragon fly). Kellogg in his catalogue and host list published in Genera Insectorum in 1908 gives *Cavia cobaya* as the only host species. This is the only host mentioned by Mjöberg (1910), Neumann (1912), and Kellogg and Ferris (1915).

GYROPUS FORFICULATUS Neumann.

Plate 1, fig. 2.

A medium-sized stout species with conspicuous setae. Head about as broad as long; temporal lobes somewhat projecting; antennae rather larger than usual and completely filling the long deep antennal fossae; palpi small and not reaching the anterior margin of the large labium. Above the head bears a transverse row of six, large, subequal setae on the temporal region. Prothorax about equal to the head in width, its anterior margin straight, lateral margin at first almost straight and subparallel, then about straight but strongly converging posteriorly. At the anterior corners of the prothorax is a pair of long curved setae; about half a dozen equally long setae are borne above. Mesothorax, which is not very distinctly separated from the metathorax, is much smaller and narrower than the prothorax, and constitutes the narrowest part of the body. Metathorax with straight, posteriorly divergent sides, and about as large as the prothorax. Abdomen broad, oval, with serrate margins and well clothed, with large conspicuous setae. Gonopods of female low, inconspicuous but fringed with conspicuous setae, the inner two of which are stouter than the rest. Genital armature of male large, conspicuous and well chitinized; basal plate long and broad with straight sides that diverge posteriorly; parameres short and stout, mandiblelike. In the female, legs subequal; femoral tenaculum single-lobed ventrally and bilobed dorsally, with crotch conspicuously lined, or furrowed. In the male, front legs (pl. 1, fig. 2) larger than the rest and each provided with a clasper formed of the tarsal claw and a long thumb from the first tarsal segment. This thumb is fully as long as the claw, broadest at its base, and bears a single small seta near its tip.

Length of female, 1.58 mm.; width, 0.74 mm. Length of male, 1.50 mm.; width, 0.67 mm.

Type host and type locality.—From *Ctenomys*, species, Tucumán, Argentina.

Description based on two females and one male combed from a female skin of *Ctenomys opimus* (Cat. No. 121168, U.S.N.M.) from Oruro, Boliva. Neumann had a quantity of males and females collected on *Ctenomys*, species, from Tucumán, Argentina, by F. Lahille.

GYROPUS POLLICARIS, new species.

Plate 1, fig. 3.

Quite similar to *G. forficulatus* Neumann, but more slender and differing in several minor characters. Head as broad as long, with posterior margin almost semicircular; antennal fossae deep, ventral borders more deeply notched than dorsal; last segment of antenna with a straight lateral margin and broadly and evenly rounded inwardly and posteriorly; palpi conspicuous, each with its four segments clearly demarcated, second segment as broad as first. Prothorax not so broad as head and almost twice as broad as long. Mesothorax the narrowest region of the body. Metathorax with straight, posteriorly divergent sides. It is about equal to prothorax. Abdomen fully twice as long as broad and clothed with conspicuous setae. Male genital armature large, well chitinized and compact; basal plate over twice as long as its greatest width, its straight sides diverging posteriorly; parameres not mandible-like. Legs rather stout, the anterior pair of male slightly stouter than the others and with well-developed tarsal thumb. Tarsal thumb (pl. 1, fig. 3) as long as claw and gradually increasing in width from apex to base, laterally with two setae, the one near the apex being the smaller.

Tarsal claw slightly curved and with inner margin irregularly serrate toward the base.

Length of male, 1.81 mm.; width, 0.58 mm.

Type host and type locality.—*Ctenomys osgoodi* from near head of Rio Chico, Santa Cruz, Argentina.

Type slide.—Cat. No. 23749, U.S.N.M.

Described from a single specimen, the holotype, which is a male. This species differs from *G. forficulatus* in a number of characters, the more important of which are: The more slender body, the shorter and differently shaped tarsal thumb, the large palpi, and various differences in the genital armature of the male.

GYROPUS LATIPOLLICARIS, new species.

Plate 1, fig. 4.

Similar to *G. pollicaris*, but differing only in a few minor details. Temporal angles rather sharp; antennae large and in the case of female specimens frequently with the last two segments aborted or broken off; palpi rather large and with the four segments very pronounced. Prothorax with anterior margin almost straight, sides about straight and subparallel for a part of their length, then strongly converging to the posterior end of the segment. Mesothorax about twice as broad as long and with sides slightly diverging posteriorly. Metathorax scarcely as large as prothorax and with sides strongly divergent posteriorly. Abdomen fully twice as long as broad and sometimes more than twice as long. Gonopods of female vestigial but provided with the usual fringe of long setae. Male genital armature compact, conspicuous, and with large basal plate, the sides of which diverge slightly posteriorly. Legs nearly subequal in female, but in male first pair larger and stouter than the others. Thumb of tarsus I of male (pl. 1, fig. 4) much swollen and strongly curved and bearing near its tip three subequal setae.

Length of female, 2.00 mm.; width, 0.72 mm. Length of male, 1.97 mm.; width, 0.63 mm.

Type host and type locality.—*Ctenomys osgoodi* from Rio Chico, Santa Cruz, Argentina.

Type slide.—Cat. No. 23750, U.S.N.M.

Described from three females and three males on a male skin of *Ctenomys osgoodi* (Cat. No. 84160, U.S.N.M.) from Rio Chico, Santa Cruz, Argentina, and two males found on a female skin of *Ctenomys osgoodi* (Cat. No. 84165, U.S.N.M.) from Pacific slope, Chile, near head of Rio Chico, Santa Cruz, Argentina. It would hardly seem that two species so nearly related as *G. pollicaris* and *G. latipollicaris* should exist together on the same host, yet the differences in the tarsal thumb of the males are accompanied by several differences in the male genitalia of the two forms.

GYROPUS GRACILIPES, new species.

Text fig. 7.

A long slender species, with the posterior legs more slender than the middle ones. Head as broad as long; temporal lobes with rather sharp lateral angles. Antennae about filling the antennal fossae; inner margin of last segment longer than the outer and very strongly curved, outer margin almost straight, sensory pit conspicuous but not deep. Palpi not reaching the outer margin of labrum and with all four segments very distinct. Prothorax almost as broad as the head, anterior margin almost straight and lateral margins subparallel toward the front but strongly divergent posteriorly. Mesothorax about twice as broad as long and almost as broad as the prothorax, its sides diverging posteriorly. Metathorax about as broad and as long as the prothorax, its sides diverging posteriorly. Abdomen fully twice as long as broad, sides almost parallel and end of abdomen in female truncate. The abdomen is clothed with long conspicuous setae. Gonopods of female rudimentary, but each with the usual conspicuous fringe of setae, the two inner ventral of which are exceedingly minute, the third and fourth are stoutest, approximate and subequal. Genital armature of male conspicuous, compact, and well chitinized; basal plate long, with sides slightly concave and divergent posteriorly. In the female the first and second pairs of legs subequal, with the last pair smallest. First pair of legs of male the largest and the last pair the most slender. Tarsal thumb of male as in *G. latipollicaris*. Femur III longer and narrower than femur II and with the tenaculum greatly reduced; tibia III much longer and considerably narrower than tibia II; tarsus III (fig. 7) much more slender than II and with transverse striations much less pronounced; tarsal claw III considerably longer and sharper than tarsal claw II.

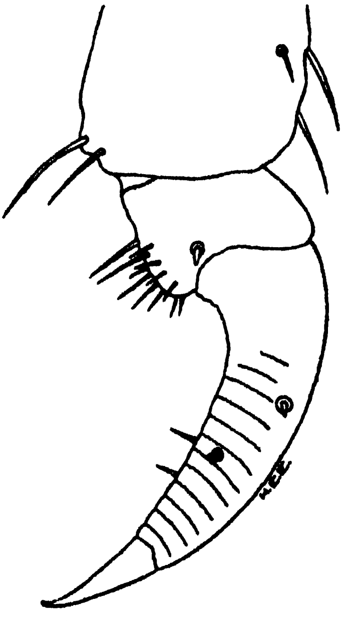

FIG. 7.—GYROPUS GRACILIPES. POSTERIOR VIEW OF TARSUS III.

Length of female, 1.69 mm.; width, 0.60 mm. Length of male, 1.68 mm.; width, 0.57 mm.

Type host and type locality.—*Ctenomys colburni* from Huanuluan, Rio Negro, Argentina.

Type slide.—Cat. No. 28751, U.S.N.M.

Described from four females and one male collected on a female skin of *Ctenomys colburni* (Cat. No. 238122, U.S.N.M.), taken at Huanuluan, Rio Negro, Argentina. This species is easily distinguished from all others in the genus on account of its long body and slender posterior legs.

GYROPUS WETMOREI, new species.

Text figs. 8 and 9.

A medium-sized, rather stout species. Head about as broad as long; temporal lobes somewhat projecting, with rounded angles; antennal fossae deep, but filled with antennae in repose, the latter somewhat stout with the last segment almost spherical except for the flat, truncate end; palpi large, extending to the front margin of labrum, the four segments very distinct. Dorsally near the posterior margin, the head bears a transverse row of six large setae. Prothorax almost as broad as the head, with anterior margin almost straight, from each anterior angle of prothorax there arises a large, curved seta. Mesothorax over twice as broad as long and almost as broad as prothorax; its sides strongly divergent posteriorily. Abdomen about two-thirds as broad as long and clothed with conspicuous setae. Gonopods, low semicircular ridges with a fringe of medium-sized setae. Legs almost equally stout, yet the posterior pair is observed to be more slender than the middle pair; femoral tenaculum of leg III (fig. 8) smaller than tenaculum of leg II; claw of tarsus III slightly longer than claw of tarsus II.

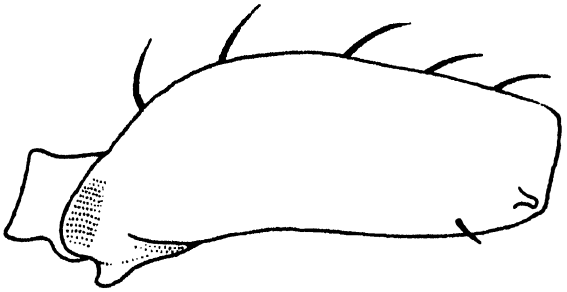

FIG. 8.—GYROPUS WETMOREI. POSTERIOR VIEW OF FEMUR III.

Length, 1.41 mm.; width, 0.55 mm.

Type host and type locality.—From male skin of *Ctenomys*, species (Cat. No. 236336, U.S.N.M.: Biol. Surv. Collection) taken at Tapia, Tucumán, Argentina.

Type slide.—Cat. No. 23752, U.S.N.M.

Description based on two females on type slide, which are a part of a lot of four females and five young taken from a skin of male *Ctenomys* (Cat. No. 236336, U.S.N.M.: Biol. Surv. Collection) collected at Tapia, Tucumán, Argentina, April 11, 1921, by A. Wetmore.

There is at hand also a lot from the same place by the same collector consisting of three females and one nymph taken on a male skin of *Ctenomys*, species (Cat. No. 236385, U.S.N.M.: Biol. Surv. Collection), April 9, 1921.

ALLOGYROPUS, new genus.

Head broad; antennal grooves not so broad as in other genera. Tarsus I provided with a single claw. Femur II and III each provided with a forked and furrowed tenaculum for holding tarsus. Tarsus II and III each with second segment greatly elongated and transversely furrowed and with the claw proper, which is greatly reduced, forming a clawlike structure adapted for fitting into femoral tenaculum. Tibia I without a row or toothlike setae on a swollen or thumblike expansion at the inner distal margin. Abdomen oval, typically each segment with one transverse row of setae. Sexual dimorphism slight or wanting.

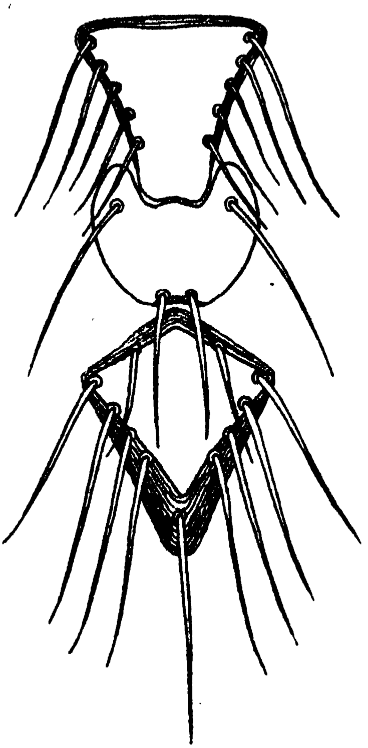

FIG. 9.—GYROPUS WETMOREI. STERNAL PLATES OF FEMALE.

Genotype and its host species.—*Gyropus amplexans* Neumann from *Dasyprocta aguti*.

The following species are included in this genus: *G. amplexans* Neumann, *G. setosus* (Neumann), and *G. turbinatus* (Piaget). The separation of the species which have but a single transverse row of dorsal setae to each abdominal segment from the others of the genus *Gyropus* has its justification, it is believed, in its analogy to the similar process by which certain genera of sucking lice are separated. Unfortunately the writer has never encountered any of the species of this genus. Neumann (1912) has separated them as follows in his key:

a.^{1} Abdomen with hairs and setae very unequal__________**A. setosus** (Neumann).
a.^{2} Abdomen with hairs and setae equal.
  b.^{1} Abdomen with rows of setae short, interrupted on the median line and toward the sides. Head much broader than long.
    A. turbinatus (Piaget).
  b.^{2} Abdomen with rows of very short setae across the whole width of the segment. Head scarcely broader than long__**A. amplexans** (Neumann).

TETRAGYROPUS, new genus.

Head broad; temples broad and somewhat squarish. Tarsus I provided with a single claw. Femur II and III each provided with a forked and furrowed tenaculum for holding tarsus. Tarsus II and III each with second segment greatly elongated and transversely furrowed and with the claw proper, which is greatly reduced, forming a clawlike structure adapted for fitting into femoral tenaculum. Tibia I without a row of toothlike setae on a swollen or thumblike expansion at the inner distal margin. Abdomen oval, typically each segment without any transverse row of setae, the latter being arranged so as to form at least four longitudinal rows. Sexual dimorphism slight or wanting.

Genotype and its host species.—*Gyropus lineatus* Neumann from *Kerodon moco.*

Three species are for the present placed in this genus, but further study may necessitate the erection of a new genus for one of them which comes from a primate host. Contained species: *T. lineatus* (Neumann) and two species to be described in this paper.

KEY TO THE SPECIES OF TETRAGYROPUS.

a.^{1} Mesothorax about equal in width to the prothorax; last segment of antenna longer than broad; tubercle of femoral tenaculum rounded.
  b.^{1} Accessory tubercle of femoral tenaculum large and conspicuous; segments three and four of abdomen without any long lateral setae.
    T. lineatus (Neumann).
  b.^{2} Accessory tubercle of femoral tenaculum small; segments three and four of abdomen each with a pair of long lateral setae.
    T. setifer, new species.
a.^{2} Mesothorax much broader than prothorax; tubercle of femoral tenaculum very large, conspicuous and angulate__________**T. aotophilus**, new species.

TETRAGYROPUS LINEATUS (Neumann).

Head slightly broader than long; temporal lobes rounded, practically without angles; antennal fossae deep, posterior wall striate, inner margin of each fossa doubly emarginate hence somewhat E-shaped. Palpi almost reaching the anterior margin of labrum. Prothorax almost as broad as head, with sides strongly convergent posteriorly. Mesothorax about equal to prothorax in width and length but differently shaped. Metathorax broader than mesothorax and similarly shaped. Abdomen about twice as long as broad and with four longitudinal rows of straight setae, each seta extending to the base of succeeding seta, thus making four continuous lines across the abdomen. Long lateral setae, much longer than the dorsal setae, are on segments V, VI, and VII. Gonopods low and each with a fringe of long, conspicuous setae. Treatment with potassium hydroxide shows that the abdomen is provided with poorly chitinized pleural plates; typically, one of these is narrow at its anterior end where the spiracle is situated and expanded and truncate at its posterior end, at which end is situated the large lateral hair. Anterior pair of legs much smaller than the others; second segment of tarsus I longer than usual and apparently forming a part of the tarsal claw; tarsal claw proper reduced and shortened. Femora II and III stout, each with a very large tenaculum; segment I of tarsus III as broad as long and forming with segment II and the tarsal claw, the large claw-like tarsus itself; at the base of segment II on the inside is a seta.

Length, 1.34 mm.; width, 0.58 mm.

Type host and type locality.—*Kerodon moco* from Para, Brazil.

Description based on a female specimen on male skin of *Proechimys mincae* (Cat. No. 123490, U.S.N.M.) from Manzanares, Colombia. A young specimen taken on female skin of *Kerodon australis* (Cat. No. 84177, U.S.N.M.), from Upper Rio Chico, Santa Cruz, Argentina. Neumann described this species from some specimens taken on *Kerodon moco*, from Pará, Brazil, by Goeldi.

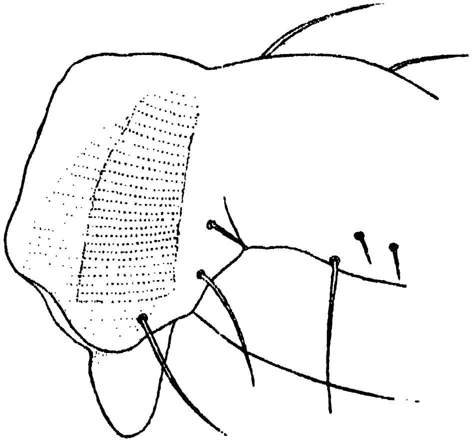

FIG. 10.—TETRAGYROPUS SETIFER. VENTRAL VIEW OF BASE OF FEMUR III.

TETRAGYROPUS SETIFER, new species.

Text fig. 10.

A medium-sized, rather stout species. Temporal lobes without lateral angles; antennal fossae deep, each with inner border concave throughout. Antennae of the usual shape, last segment longer than broad, conspicuously scaled, and with a deep emargination on the outside. Palpi with the four segments very distinct; third segment almost as broad as first and nearly twice as broad as fourth segment; fourth, or last, segment slightly longer than broad and bearing several setae at its tip. Below, on the temporal region, the head bears on either side two approximate long setae and above a transverse row of six large dorsal setae, the outer pair being situated about twice as far from the middle pair as the inner pair. Prothorax three-fourths as broad as head, sides rounded toward the front and then almost straight and converging posteriorly. Mesothorax not so broad as prothorax; metathorax about equal to prothorax in width. Abdomen sparsely clothed with setae, the largest of which are arranged into four longitudinal rows. Large lateral setae on segments III, IV, V, VI, and VII. Gonopods rudimentary but their setae unusually large, some of them being about as long as the lateral setae. Legs II and III subequal and each with the accessory tubercle of femoral tenaculum small (fig. 10). The front pair of legs is broken off of the single specimen at hand.

Length, 1.51 mm.; width, 0.55 mm.

Type host and type locality.—*Hoplomys gymnurus* from San Javier, Ecuador.

Type.—Cat. No. 23753, U.S.N.M.

Described from a single female, the holotype, combed from the skin of a male *Hoplomys gymnurus* (Cat. No. 113270, U.S.N.M.) from San Javier, Ecuador. This species is particularly differentiated from *T. lineatus* by the characters given in the key.

TETRAGYROPUS AOTOPHILUS, new species.

Text fig. 11.

Last nymphal instar.—Head broader than long; temporal lobes not evenly rounded; antenae short, last segment spherical; palpi with four segments distinct. Above, the head bears two transverse rows of setae; one of minute setae across the middle part of the head and one of very large, straight setae, eight in number, near the posterior border. Prothorax small, slightly over one-half as broad as the head and irregularly diamond-shaped; on its posterior border is situated a row of four large dorsal setae. Mesothorax large, equal to the head in length and width, sides diverging posteriorly; above, near the middle, is a pair of long setae and at each posterior corner is a large seta. Metathorax slightly broader than the mesothorax and about as long; above it has two pairs of lateral setae and several other smaller setae. Abdomen oval, almost as broad as long, provided above with four longitudinal rows of conspicuous setae, the setae of the two outer rows being smaller than those of the two inner, and two sublateral longitudinal rows of minute setae, there being a single seta to each abdominal segment. Lateral setae present on each abdominal segment except the last and almost enormous in size. Legs very stout, the anterior pair the smallest and the second and third pair subequal. In the case of either leg II or III the femur is very stout and short, and the tubercle of the femoral tenaculum is long, angulate and doubtless acts as a thumb in apposition to the tarsus, the tibia is bent into an elbow near its base, and the tarsus is very large and stout and about equals the tibia in length. Tarsal claw of leg I almost straight except for curve near its base and very stout, tarsi II and III exceedingly small and stumpy, being about as broad at their bases as they are long.

Length of last nymph, 1.11 mm.; width, 0.47 mm.

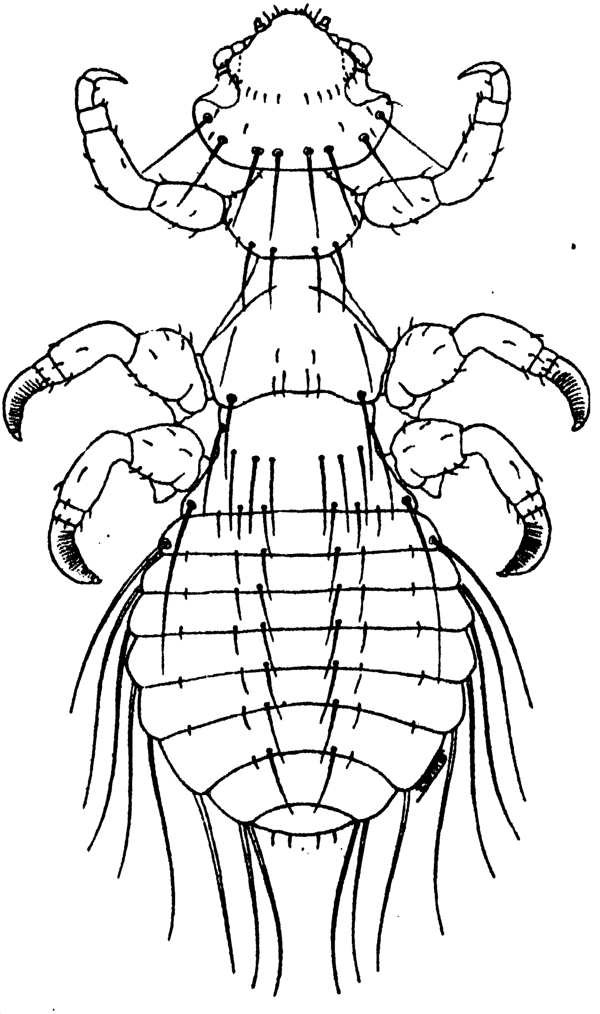

FIG. 11.—TETRAGYROPUS AOTOPHILUS. DORSAL VIEW OF NYMPH, × 100.

Egg.[1]—About twice as long as broad and with a rather small operculum. Operculum circular, with a row of about a dozen nodular cells around its rim and the central area lifted into a domelike cone. Rim of opercular opening with a small flange. Cement attachment structure conspicuous; hair attachment sheath very long, being longer than the egg itself; free end of attachment sheath over twice as long as cement cup; cement cup embracing less than a third of the egg surface.

Length of egg, 0.62 mm.; width, 0.35 mm.

Type host and type locality.—*Aotes boliviensis* from Bolivia.

Type.—Cat. No. 23754, U.S.N.M.

The descriptions here given, based on the last nymph and egg, would not, under ordinary conditions, be offered for a new species. However, the occurrence of a species of Gyropidae on a primate host is such an unexpected thing, and the evidence of its breeding on and infesting the monkey host is so conclusive, that the description of the species from a nymph seems justified. One specimen in good condition on skin of *Aotes boliviensis* (Cat. No. 3335, U.S.N.M.) taken in Bolivia by W. E. Moore some time before 1859. Locality not known but evidently from a tropical forested region. Not only was the louse found deep in the fur of the skin, but several nits were present, indicating the normal reproduction of the species on the monkey host of the family Cebidae.

MACROGYROPUS, new genus.

Tarsus I provided with two claws. Femur II and III each provided with a forked and furrowed tenaculum for holding tarsus. Tarsus II and III each with second segment greatly elongated and transversely furrowed and with the claw proper, which is greatly reduced, forming a clawlike structure adapted for fitting into femoral tenaculum. Tibia I with a row of toothlike setae on a swollen or thumblike expansion at the inner distal margin. Abdomen oval, typically each segment with one transverse row of setae. Sexual dimorphism slight or wanting.

Genotype and its host species.—*Macrogyropus dentatus*, new species from *Pecari angulatus crusnigrum* (Chiriqui collared peccary).

The two species included in this genus, *M. dentatus*, new species, and *M. dicotylis* (Macalister), are from American hogs or peccaries. They are both very large species, being much larger than the others of the family Gyropidae.

KEY TO THE SPECIES OF MACROGYROPUS.

a.^{1} Tibia I with a swelling on the inside distally which is not thumblike and which is provided with a longitudinal row of toothlike setae; length not over 3 mm -- **M. dentatus**, new species.

a.^{2} Tibia I with a prominent thumblike process on its inner distal aspect; length of species over 3.5 mm ------------------------------ **M. dicotylis** (Macalister).

MACROGYROPUS DENTATUS, new species.

Plate 1, fig. 5.

Female.—Head broader than long; temporal lobes not evenly rounded; antennal fossae short and ending in a deep pit posteriorly; palpi with the four segments very distinct and not extending beyond the margin of the head. Antennae rather small for such a large species, third segment very distinct from the last which is almost cylindrical. Prothorax about three-fourths as broad as the head and much the broadest at its middle. Mesothorax about as broad as the head and with sides divergent posteriorly. Metathorax broader than the mesothorax and similarly shaped. Abdomen with swoolen sides and almost twice as long as broad; above each segment has a single transverse row of small, short setae and a pair of much larger lateral setae. Gonopods low and each with a fringe of about six or eight setae. Tibia I (pl. 1, fig. 5) with its inner distal border expanded into a lateral lobe which is fringed with a row of short, stout, subequal, toothlike setae. Tarsus I with first segment slightly curved and almost as long as broad, second segment longer than broad. Distally tarsus I bears two claws; the anterior, which is much the larger, is almost equal to segment II in length, evenly curved on the outside and slightly toothed on the inside; the posterior claw is not more than a third as long as the anterior one and is simple.

Length, 2.73 mm.; width, 1.15 mm.

Egg.—Very long, about three times as long as broad, and with non-opercular end free, not being encompassed by any cement cup. Operculum large, fringed on its circumference with a single row of nodular cells of which there are about three dozen, central area evenly rounded and smooth. Rim of opercular opening with slight flange. Cement attachment structure not conspicuous; hair attachment sheath never over two-thirds as long as the egg itself and without a free end; cement cup wanting, the egg being held entirely by cement adhering to its sides.

Length, 1.10 mm.; width, 0.45 mm.

Type host and type locality.—*Pecari angulatus crusnigrum* from Greytown, Nicaragua.

Type slide.—Cat. No. 23755, U.S.N.M.

Described from specimens on type slide except for the description of egg. The following material at hand: Four females, two young and two eggs on skin of *Pecari angulatus crusnigrum* (Cat. No. $\frac{16358}{23298}$, U.S.N.M.) from Greytown, Nicaragua, by Doctor Birt; one egg on skin, Cat. No. 12074, U.S.N.M., and three eggs on skin, Cat.

No. 12095, U.S.N.M. of *Pecari angulatus crusnigrum* from Talamanca, Costa Rica, 1874, by W. M. Gabb.

A further study of the lice of the peccaries is much to be desired. Nits of what is evidently an undescribed species of *Macrogyropus* occur on a skin of the Costa Rican white-lipped peccary (*Tayassu pecari spiradens*) in the United States National Museum.

HETEROGYROPUS, new genus.

Head very broad, about twice as broad as prothorax, and with deep antennal fossae. Tarsus I provided with two claws. Femur II and III each provided with a forked and furrowed tenaculum for holding tarsus. Tarsus II and III each with second segment greatly elongated and transversely furrowed and with the claw proper, which is greatly reduced, forming a clawlike structure adapted for fitting into femoral tenaculum. Tibia I without a row of toothlike setae on a swollen or thumblike expansion at the inner distal margin. Abdomen oval, typically each segment with one transverse row of setae. Sexual dimorphism probably wanting.

Genotype and its host species.—*Heterogyropus heteronychus*, new species, from *Kerodon spixii.*

This genus, with its single species, is of particular interest as it probably bridges over the gap between the one-clawed and two-clawed mammal infesting *Amblycera;* however, the accessory claw may not prove to be a real tarsal claw from the standpoint of homology; or, again, its presence may be due to regression, in which case the genus should not be considered as an intermediate one. In *Macrogyropus* the accessory claw is quite small, being almost vestigial.

HETEROGYROPUS HETERONYCHUS, new species.

Plate 1, fig. 6, and text figs. 2 and 12.

A medium-sized pale species. Head broader than long; temples projecting, without angles; antennal fossae broad and deep. Last two segments gone from both of antennae. Palpi with the four segments quite distinct, last segment about one and a half times as long as broad and reaching to the anterior margin of the labrum. Dorsally the head is sparsely clothed with small setae, many of which are arranged into a transverse row across the temporal region; two large setae are situated on each lateral margin of temples. Prothorax somewhat over one-half as broad as the head, about twice as broad as long and with sides rounded; mesothorax much broader than prothorax but scarcely as broad as the head; metathorax as long as mesothorax and slightly broader. Abdomen oval, about one and a half times as long as broad; each segment, except the last one, bears above a transverse row of short setae situated almost on the posterior border and at each side a long lateral seta. Gonopods not well developed but fringed with conspicuous setae. Legs moderate, first pair smaller than the other two pairs which are subequal. Tarsus I (pl. 1, fig. 6) with first segment about twice as broad as long, second segment about twice as long as broad, curved and with five setae on its inside border, claws unequal, the ventral claw being only about one-half as long as the dorsal one, dorsal claw only slightly curved and with a tooth below near its apex. Femora II and III long and each with well developed tenaculum; tibiae II and III but very slightly curved and broadest near their middle; tarsi II and III each formed into a clawlike structure which consists of first and second segments and the minute, terminal, true tarsal claw.

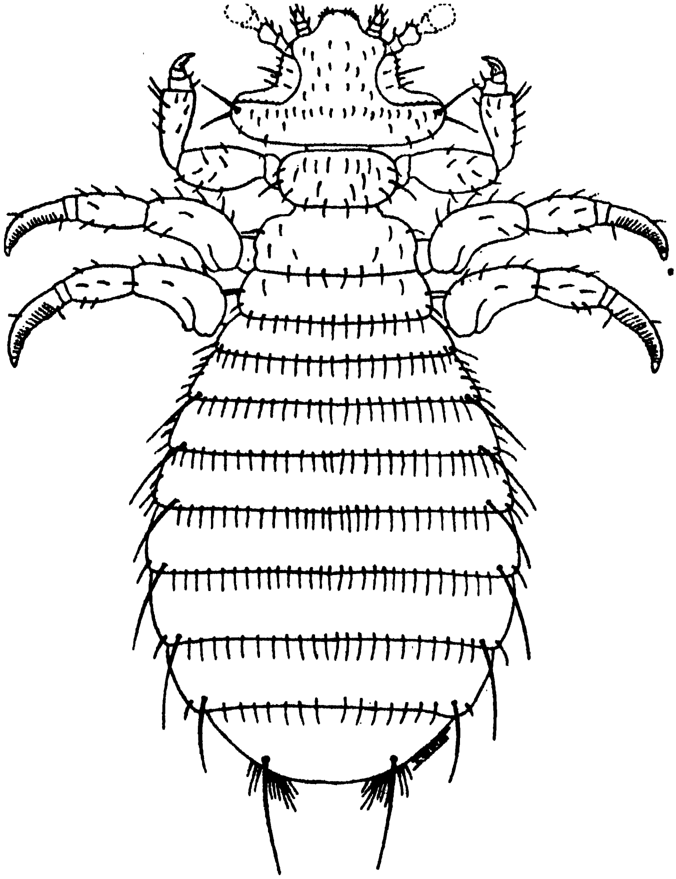

FIG. 12.—HETEROGYROPUS HETERONYCHUS. DORSAL VIEW OF FEMALE, × 90. (LAST TWO SEGMENTS OF EACH ANTENNA WANTING.)

Length, 1.16 mm.; width, 0.50 mm.

Type host and type locality.—*Kerodon spixii* from Lamaras, Bahia, Brazil.

Type.—Cat. No. 23757, U.S.N.M.

Described from the holotype, a female specimen, complete and unbroken except for the antennae, on a female skin of *Kerodon spixii* (Cat. No. 123391, U.S.N.M.) from Lamaras, Bahia, Brazil, May 15, 1903, by A. Robert.

The relationship of this species to those of *Macrogyropus* which are found on American pigs (peccaries) is indicated not only by the presence of two claws on the front tarsus, but by the size and shape of the prothorax, by the shape of the meso, metathorax and the abdomen, but the size and arrangement of the body setae and, finally, by the similarity in the species in the last two pairs of legs.

GLIRICOLINAE, new subfamily.

Members of this subfamily are at once distinguished from all others by the very unusual character of the legs. The tarsi are greatly reduced, the tarsal claw is wanting and in its place is found a pulvilluslike appendage of the reduced second tarsal segment. The second and third pairs of legs are enlarged with the femora and tibiae curved and transversely striated. These legs are, as far as the writer has observed, used as hair-claspers, those on one side of the body apposing those on the other side, or the tibia of one leg acting in apposition to the femur of the same leg. The head, in keeping with the whole body, is long and slender, and below has two well-developed hornlike structures, that, according to Mjöberg, are capable of both longitudinal and lateral motion. These hornlike structures are the outer hypopharyngeal chitinizations and probably are used in cutting or piercing.

Contained genera.—*Gliricola* Mjöberg and a new genus to be here established.

PARAGLIRICOLA, new genus.

Body long and slender. Head longer than broad, with posterior margin semicircular; temples with a transverse row of setae; anterior horns of hypopharyngeal chitinization unarmed. Prothorax much smaller than meso-metathorax, and provided with a transverse row of minute, dorsal setae; meso-metathorax with two such transverse rows. Abdomen the broadest part of the body and with each segment, except the last, provided dorsally with a single, transverse row of exceedingly minute setae. Tarsi with second segment greatly reduced and clawless, but with a clawlike seta developed on the outer distal aspect.

Genotype and its host species.—*Paragliricola quadrisetosa*, new species, from *Cavia tschudii.*

Only a single species is included in this genus which differs from *Gliricola* fundamentally in its unarmed hypopharyngeal chitinization. In *Gliricola* this chitinous structure is armed with teeth distally and along its inner margins is serrate.

PARAGLIRICOLA QUADRISETOSA, new species.

Plate 1, fig. 7, and text figs. 13 and 14.

A long, slender species. Head considerably longer than broad, posterior margin semicircular; antennal fossae very long and deep; antennae rather long, last segment subspherical with deep notch on outside and a conspicuous sensory pit; palpi extending beyond margin of head, second segment about twice as long as first and longer than broad. Prothorax much narrower than the head but broader than long; its sides rounded, and above near the middle is a transverse row of minute setae. Meso- and metathorax completely united into a single segment which is about as broad as the head, and as broad as long, and bears dorsally two transverse rows of minute setae. Abdomen about twice as long as broad and posteriorly bilobed; first segment longest, except for the modified last segment; each of the abdominal segments except the last with a transverse row of minute dorsal setae near the posterior margin and segments two and three each with a pair of long lateral setae. Each posterior lobe of abdomen flattened, expanded shelflike laterally beyond the lateral margin of the last segment, and posteriorly into a long tuberclelike process; lateral expansions each with two conspicuous subequal setae situated on the posterior margin and tuberclelike processes each with two terminal, subequal, narrow, leaflike setae, and dorsally at its base a long seta fully twice as long as

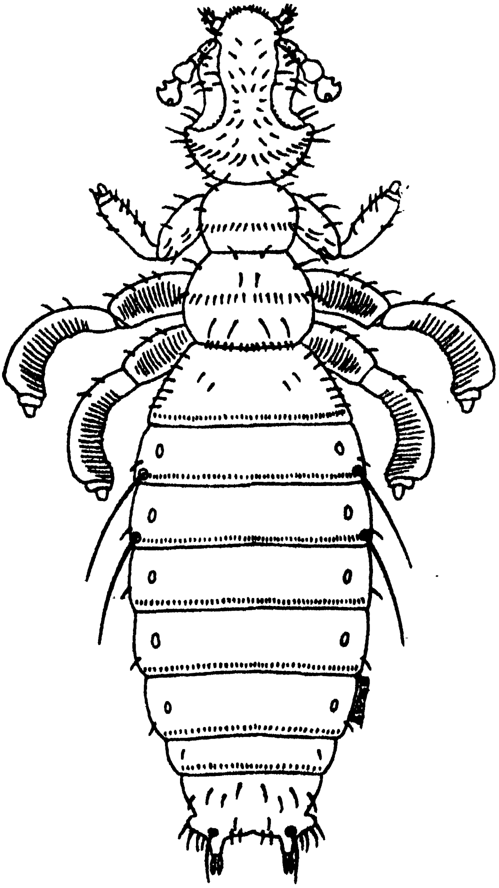
Fig. 13.—Paragliricola quadrisetosa. Dorsal view of female, × 100.

the process itself. Gonopods large, conspicuous, almost as broad at tips as at their bases, and lying below lateral expansions of posterior lobes; each gonopod with three subequal terminal setae which are fully equal to the gonopod itself in length, and three smaller, unequal setae along the posterior margin; the posterior terminal seta and the three marginal setae are slightly flattened but are hardly foliaceous. First pair of legs much smaller than the others: tibia I (pl. 1, fig. 7) enlarged distally and provided along its inner distal margin with a row of minute setae; tarsus I (pl. 1. fig. 7) with first segment broader than long; second segment reduced and pulvilluslike, with a few transverse striations; on the inside and on the outside with a curved, clawlike seta situated on chitinous tubercle. The tibiae of the last two pairs of legs are more strongly curved than the femora.

Length, 1.07 mm.; width, 0.30 mm.

Type host and type locality.—*Cavia tschudii* from La Raya Pass (4,267 meters, 14,000 feet), Peru.

Type.—Cat. No. 23758, U.S.N.M.

The holotype is a stained female specimen found on a female skin of *Cavia tschudii* (Cat. No. 194492, U.S.N.M.), from La Raya Pass, Peru. Two other female specimens are at hand which appear to agree in all particulars with the holotype. One is a female specimen from skin of female *Cavia* species (Cat. No. 236345, U.S.N.M.: Biol. Surv. Collection) taken at Guamini, Buenos Aires, Argentina, March 3, 1920, by A. Wetmore. The other is a female specimen found on a female skin of *Kerodon spixii* (Cat. No. 123391, U.S.N.M.), from Bahia, Lamaras, Brazil.

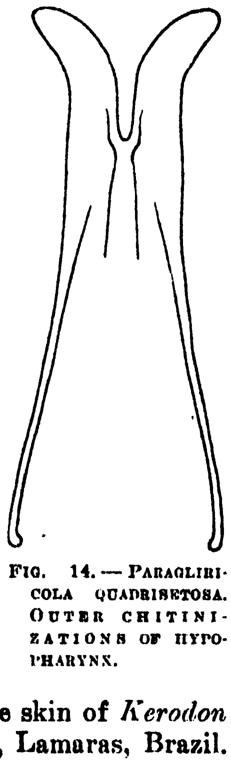

FIG. 14.—PARAGLIRICOLA QUADRISETOSA. OUTER CHITINIZATIONS OF HYPOPHARYNX.

Genus GLIRICOLA Mjöberg.

Body slender. Head longer than broad, with posterior margin semicircular; anterior horns of hypopharyngeal chitinization armed at their apices with teeth and provided with serrate inner margins (fig. 15). Prothorax much smaller than the meso-metathorax. Typically each segment of the abdomen provided dorsally with a single, transverse row of minute setae. In female, abdomen two lobed. Second segment of tarsus somewhat like a pulvillus, soft and transversely striated and bearing no claw-like setae.

Genotype and its host species.—*Gliricola porcelli* (Linnaeus) from *Cavia cobaya* (guinea pig).

In this genus there are included besides the type a subspecies of the same, *G. porcelli perfoliatus* (Neumann), a new species to be described in this paper and probably the *Gyropus decuratus* of Neumann. It will be necessary to study the hypopharyngeal chitinizations of this latter species before its generic affinities can be ascertained with certainty.

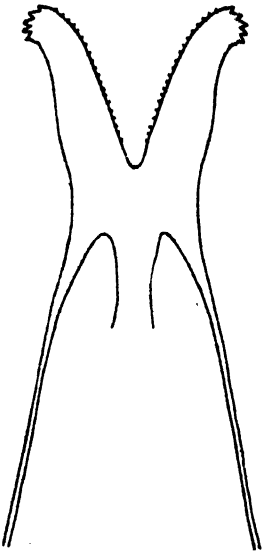
FIG. 15.—GLIRICOLA PORCELLI. OUTER CHITINIZATIONS OF HYPOPHARYNX.

KEY TO SPECIES OF GLIRICOLA.

$a.^1$ Lateral chitinizations of basal plate of female genital armature thickened; male genital armature with parameres strongly curved and claw-shaped endomeres present.
G. distincta, new species.

$a.^2$ Lateral chitinizations of basal plate of female genital armature more slender; male genital armature with almost straight parameres and no well-chitinized endomeres.
G. porcelli (Linnaeus).

GLIRICOLA DISTINCTA, new species.

Text fig. 16.

Head longer than broad, with posterior margin semicircular; antennal fossae long and deep, its inner margin with three emarginations; antennae each with last segment greatly swollen and pedicellate, its anterior margin with a great notch and its tip truncate. This last segment is scaled, from its truncate tip there arises five straight setae, and situated at this tip is the large sensory pit. Palpi extending beyond the margin of the head by the full length of the last segment, which is about twice as long as broad. Prothorax almost as broad as the head and about twice as broad as long. Mesothorax entirely fused with metathorax; this combined segment is slightly longer and slightly broader than the prothorax. Abdomen from two or three times as long as broad, being bigger and stouter in the female than in the male, first segment longer than the others, except for the last. Gonopods semicircular and scooplike and practically continuous with the posterior abdominal lobes. The setae on a single gonopod are as follows from the front backward: First, at the base of the gonopod, is a simple, curved seta; next comes two subequal narrow foliaceous setae slightly longer than the simple seta; lastly, are three broader and longer foliaceous setae, each of which ends in a slender spine. Each gonopod ends in a hyaline plate which extends beyond the abdominal lobes. Abdominal lobes low and each terminated by a pair of approximate foliaceous setae.

Genital armature of male very long and slender; basal plate extending forward to the middle of fourth abdominal segment, broadened at its base and narrowest at its middle: parameres slender, curved outward and truncate at their attenuated tips. Each paramere with a small spine at about one-fourth its length from the tip and two smaller, divergent ones at its tip.

Length of female, 1.25 mm.; width, 0.27 mm. Length of male, 1.09 mm.; width, 0.22 mm.

Type host and type locality.—*Cavia anolaimae* from Paramo del Sancturio, Boyaca, Colombia.

Type slide.—Cat. No. 23759, U.S.N.M.

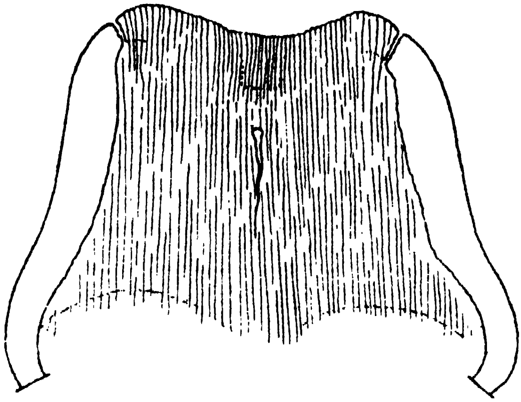

FIG. 16.—GLIRICOLA DISTINCTA. BASAL PLATE OF FEMALE GENITAL ARMATURE.

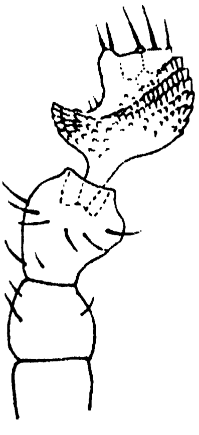

FIG. 17.—GLIRICOLA PORCELLI. LEFT ANTENNA FROM BELOW.

Described from four females and two males on a skin of *Cavia anolaimae* (Cat. No. 236907, U.S.N.M.) from Paramo del Sancturio, Boyaca, Colombia, September, 1920.

The *Gliricola* forms that occur on the different *Cavia* species are so much alike that it is hard properly to detect individual variations from those correlated definitely with a host relationship. The form from *C. anolaimae* is different, however, in this respect as it differs from those on *C. cobaya*, *C. tschudii*, *C. cutleri*, and *C. rufescens* in several characters of the genitalia as has been indicated in the key to two of the species of *Gliricola.*

GLIRICOLA PORCELLI (Linnaeus).

Plate 1, fig. 8, and text figs. 15 and 17.

Head longer than broad, posterior margin rounded; antennal fossae long and deep; antennae (fig. 17) moderate, last segment pedicellate, its capitate portion rounded at the base, truncate distally and laterally with a deep excavation. This last segment is conspicuously scaled and has about five terminal setae; palpi extending beyond the margin of head by about the full length of last segment. Outer hypopharyngeal chitinization (fig. 15) with anterior horns strongly divergent, each provided distally with five teeth and along its inner margins with minute serrations. Prothorax almost as broad as head; mesothorax and metathorax completely united and together a little longer and a little broader than the prothorax. Abdomen more slender in the male than in the female; first segment apparently divided into two by the presence of two transverse rows of dorsal setae. If this apparent division of the first segment were considered a real one the actual number of abdominal segments would be nine instead of eight. Genital armature of female as in *G. distincta* except the lateral chitinizations, or apodemes, are stouter. Male genital armature reaching the posterior border of third abdominal segment; basal plate not broadened at its base and with sides parallel; parameres almost straight except near their distal ends, each paramere rounded at its tip where are situated three minute setae. Legs about subequal; tarsus I (pl. 1, fig. 8) with first segment about as broad as long and distal segment soft, pulvilluslike with transverse lines; at the base of second tarsal segment are two seta-bearing tubercles, one being on the inside and one on the outside. These setae are straight.

Length of female, 1.18 mm.; width, 0.3 mm. Length of male, 1.03 mm.; width, 0.27 mm.

Type host and type locality.—From *Cavia cobaya*, probably in a state of domestication.

Description based on many specimens from four different species of *Cavia*. Kellogg (1908) gives only *Cavia cobaya* as a host for this species, all records coming evidently from domesticated animals. Mjöberg (1910) reported, "*Einige Exemplare von Cavia cobaya (ipse) und von 'einem schwarzen Meerschwein.'*" Neumann (1912) described a new subspecies of *G. porcelli* from *Kerodon moco* collected at Pará, Brazil. This subspecies may prove to be a good species. The writer has not seen examples of it. The material in the United States National Museum, exclusive of collections from the domestic guinea pig, are as follows: A female and nymph on *Cavia tschudii* (female) from La Raya Pass, Peru, November, 1915; four females and a transforming male, determined by Paine as *G. bicaudatus*, on *Cavia cutleri*, from Peru, by Castle; several specimens from *Cavia rufescens* in the same cage with *C. cobaya*, October 2, 1912; three females from *Cavia tschudii pallidior* (male) (Cat. No. 221015, U.S.N.M.) which died in 1919 at the National Zoological Park, Washington, D. C., the animal being originally taken at Arequipa, Peru, by W. E. Castle.

GEOGRAPHICAL AND HOST DISTRIBUTION.

The family Gyropidae is probably the most interesting in its geographical and host distribution of all the families of the order

Mallophaga. This is because of its apparent restriction to a single zoogeographical region, while its evident host distribution is on large taxonomic groups that have almost a worldwide distribution.

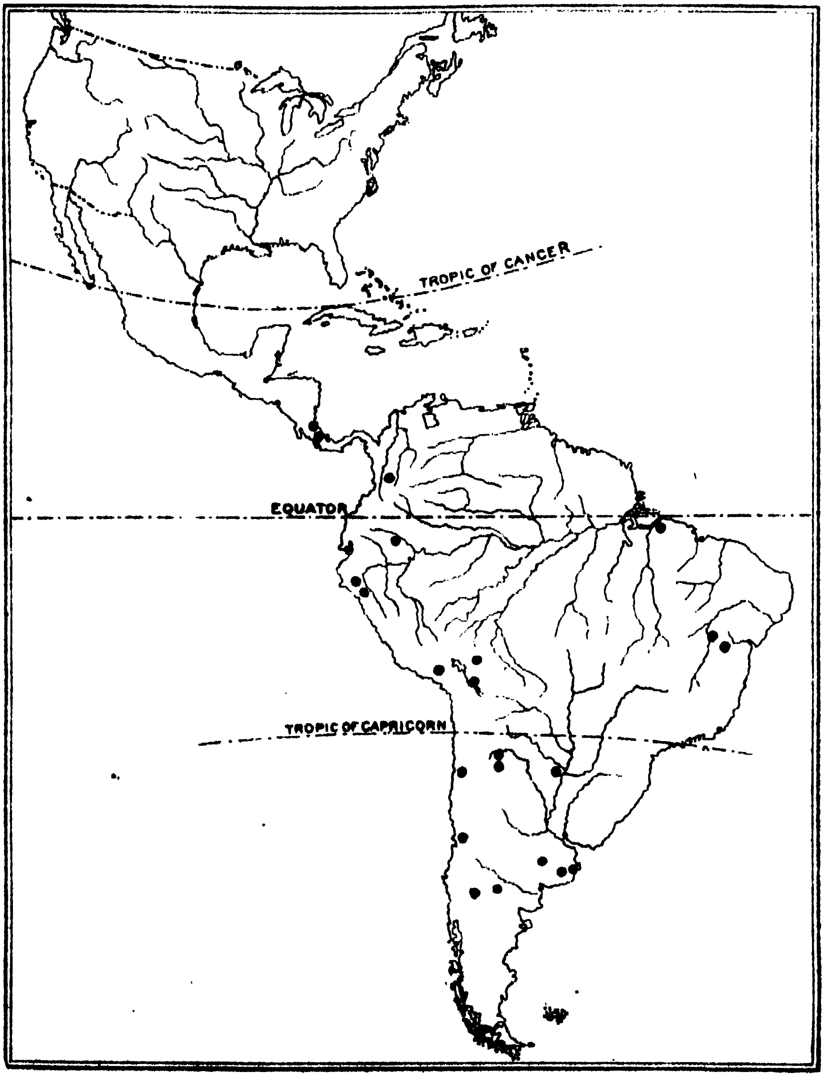

FIG. 18.—CHART SHOWING THE GEOGRAPHICAL DISTRIBUTION OF THE GYROPIDAE.

GEOGRAPHICAL DISTRIBUTION.

If we except a single record from Europe, all others, that are from hosts existing in a state of nature, come from the neotropical region. The extent of the distribution of the Gyropidae is indicated by the accompanying map (fig. 18), which shows records as far south as southern Argentina and as far north as Nicaragua, as far west as the Pacific slope of the Andes and as far east as the Atlantic coast. These records indicate that the geographical range of the family is practically coextensive with that of the neotropical region.

Vertically, specimens have been taken from practically sea level along the coast of the Province of Buenos Aires, Argentina, up to La Raya Pass, 4,267 meters (14,000 feet), in Peru. The extreme record for this elevation for a species on a cavy, *Cavia tschudii*. Since apparently all species of cavies are infested with Gyropids, and these rodents are known to range from sea level to this altitude of 4,267 meters, it may, with a high degree of probability, be inferred that the Gyropidae have this great vertical range.

The single record from Europe for *Allogyropus turbinatus* (Piaget) on *Arctomys marmotta* is to be questioned, as being an authentic one for the host species and locality of this louse. The host given is a Sciurid, and not only is this the only host species ever reported for this family of rodents, but the extensive examinations of the rodents of the family Sciuridae by several workers have failed to reveal any infesting Gyropidae. It should also be noted that up to the present no records of Gyropids from Sciurid hosts have been made in the neotropical region where these mammals extend far into the range of the Gyropid parasites.

HOST DISTRIBUTION.

More remarkable than the restriction of this Mallophagan family in its geographical distribution to a single region is its extension in its host distribution to diverse mammalian groups. These groups include certainly three different orders, and possibly four, the orders being: Edentata, Rodentia, Primates, and Ungulata. One of these orders, the Rodentia, however, includes the vast majority of the species; while of the remaining orders Ungulata has two species; Primates, one, and Edentata possibly one. Not only is the family Gyropidae concentrated chiefly on rodents but even in this order it is found only on four or possibly five or six families. It is on the Caviidae and the Octodontidae that the Gyropidae find their most favored hosts, members of these two families frequently supporting two or even three Gyropid species.

That Gyropids normally infest edentates should be questioned. The single record of *Gyropus hispidus* Nitzsch from the sloth, *Bradypus tridactylus*, is based upon a single specimen from a dried skin. In order to establish, if possible, the validity of this record the writer has gone over the entire collection of several scores of sloth skins in the United States National Museum. During all this search not a single louse or nit was found. Added to this negative evidence is that given by Dr. W. M. Mann, who during his trip with the Mulford Expedition to South America, observed live sloths, several of which were killed and examined for lice but with negative results.

A survey also of the records for the different host families causes us to accept with very much reservation the records for two host species belonging to the order Rodentia. The single record from the Sciurid host has already been discussed. There remains for consideration the record of *Protogyropus normalis* Ewing from a species of *Oryzomys*, a member of the family Muridae. This record is based upon the obtaining of a single specimen from a recently dried skin. Although many other Murid skins, taken from the same region in South America and at the same time, were examined, no other Gyropids were obtained. On the other hand this same louse was taken in some numbers from two *Cavia* skins, thus, here is an indication of its true host relationship.

SIGNIFICANCE OF THE GEOGRAPHICAL AND HOST DISTRIBUTION.

After excluding these questionable records we are confronted with the following facts in regard to the known distribution of the species of Gyropidae. First, it is a group of a clear-cut, restricted geographical range; second, it is one with a marked and restricted preference as to host groups; third, at the same time also it is a group that is maintaining itself in nature on distantly related mammalian orders. The fact that only a very few of the species, as far as known, have successfully established themselves on indigenous representatives of distantly related orders indicates that in the phylogeny of these host orders there has been a crossing over of the ectoparasites from their most favored group, the Rodentia, to the less favored ones, the Primates and Ungulata. That the presence of Gyropidae on Primates and Ungulata is to be thus explained is further indicated by the fact that the Old World Primates and Ungulata, as well as the Nearctic Ungulata, are, to the best of our knowledge, without Gyropid lice. If their presence is to be explained by the parallelism in descent of host and parasite, certainly the neotropically exotic Primates and Ungulata should also have these gyropid species; but they do not harbor them, at least to the best of our knowledge.

Would it not be hard to get a better accumulation of circumstantial evidence for the "crossing over" of a parasite group from what is apparently its original and favored host group to others having no phylogenetic relationship to the former? But if we grant that this "crossing over" has taken place, how are we best to explain it? Evidently in the case of small wingless animals the first requirement for such a transfer would appear to be the coinhabiting of the same area by the different nonrelated host groups. This condition obtains. Next, in the case of ectoparasites provided with clinging organs in the form of hair claspers, there must be a close approximation in the physical element of the louse environment as is afforded by the pelage. Finally, the food requirements and other elements of the environments for the lice of the two host groups must approximate. A superficial examination of these conditions shows that in some of these respects some of the primates and ungulates do approximate the Caviidae and Octodontidae. Former existing species of these groups probably did so even to a greater degree.

The pelage of some mammals is of such a nature as to constitute a physical barrier to the transfer to them of such hair-clasping lice as the Gyropidae. The fur of a mole or shrew, for example, is so fine and the hairs so dense that such lice would find it physically impossible either to progress between the hairs or to clasp them effectively with their modified hair-clasping legs. Other mammals, the porcupines or some of the larger ungulates, for example, have the pelage so coarse as to present a great obstacle to the crossing over of small lice with their hair-claspers adapted for holding only medium-sized hairs.

Although the different mammalian groups through the processes of their development have arrived at their present day positions of great diversity in morphology and habits, anyone who has examined the skins of these mammalian groups has noted cases of most excellent convergence in regard to the pelage type. Take the echidnas and the porcupines and certain of the spiny rats, for example, they all have developed the long, rigid, exceedingly sharp-pointed, quill type of pelage, each quill being only a modified hair of enormous proportions. Undoubtedly these quills serve in the main the same purpose in all three groups, and they have in each instance been developed in the same way, yet from what diverse phylogenetic groups. If there is such remarkable convergence in the physical elements of the fur environment, why not in the other elements? Data in respect to these other elements unfortunately as yet have not been obtained in any comprehensive way. However, it should be noted that in the physical and chemical properties of the blood, mammalian species of diverse groups frequently show an unusual similarity.

As the forest is to a monkey, the pelage of a mammal is to a louse. Both furnish the physical background for these two respective kinds of inhabitants. In these environments are to be sought food, shelter, and the necessaries for growth, reproduction, and dissemination. Given a convergence in different forest environments a possibility is presented of their being inhabited by the same groups of forest mammals. Similarly, given a convergence in different pelage environments on the backs of mammals we would expect, and sometimes do get, the writer believes, an infestation with the same group of ectoparasites.

The convergence of the pelage environment of the two diverse mammalian groups is a necessity to the crossing over of many ectoparasites from the one to the other. That such a crossing over does occur in nature, we have an abundance of evidence, and particularly in the case of the mallophagan family Gyropidae do we have the data indicating in most convincing terms that they have jumped the phylogenetic gap between the order Rodentia and the orders Primates and Ungulata, going from their original and most favored rodent hosts to the less favored primate and ungulate hosts.

HOST LIST.

EDENTATA.

BRADYPODIDAE.

Bradypus tridactylus (sloth).
Gyropus hispidus Nitzsch.[1] (South America.)

RODENTIA.

CAVIIDAE.

Cavia anolaimae.
Gliricola distincta Ewing. (Colombia.)

Cavia cobaya (guinea-pig).
Gyropus ovalis Nitzsch. (Everywhere the host is kept in domestication.)
Gliricola porcelli (Linnaeus). (Everywhere the host is kept in domestication.)

Cavia cutleri.
Gliricola porcelli (Linnaeus). (Peru.)

Cavia rufescens.
Gliricola porcelli (Linnaeus). (Straggler?)

Cavia tschudii.
Gyropus ovalis Nitzsch. (Peru.)
Paragliricola quadrisetosa Ewing. (Peru.)
Gliricola porcelli (Linnaeus). (Peru.)

Cavia, species.
Protogyropus normalis Ewing. (Argentina.)

Cavia, species.
Paragliricola quadrisetosa Ewing. (Argentina.)

Kerodon australis.
Tetragyropus lineatus (Neumann). (Brazil.)

Kerodon moco.
Tetragyropus lineatus (Neumann). (Brazil.)
Gliricola porcelli perfoliatus (Neumann). (Brazil.)

Kerodon spixii.
Heterogyropus heteronychus Ewing. (Brazil.)
Paragliricola quadrisetosa Ewing. (Brazil.)

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[1] This species belongs to the subfamily *Gyropinae,* but its inclusion in the genus *Gyropus* is only tentative. The record is to be questioned. (See discussion under Geographical and Host Distribution.)

CHINCHILLIDAE.

Lagidium peruanum.
Gyropus alpinus Kellogg and Nakayama. (Peru.)
Lagotis cuvieri.
Gyropus lagotis Gervais.[2] (Chile.)

DASYPROCTIDAE.

Dasyprocta agouti.
Allogyropus amplaxans (Neumann). (Brazil.)
Gliricola (?) *longicollis* (Nitzsch).

MURIDAE.

Oryzomys, species.
Protogyropus normalis Ewing.[3] (Argentina.)

OCTODONTIDAE.

Abrocoma bennetti.
Monogyropus longus (Neumann). (Chile.)
Abrocoma, species.
Monogyropus longus (Neumann). (Chile.)
Ctenomys colburni.
Monogyropus parvus Ewing. (Argentina.)
Gyropus latipollicaris Ewing. (Argentina.)
Gyropus gracilipes Ewing. (Argentina.)
Ctenomys opimus.
Gyropus forficulatus Neumann. (Bolivia.)
Ctenomys osgoodi.
Gyropus pollicaris Ewing. (Argentina.)
Gyropus latipollicaris Ewing. (Argentina, Chile.)
Ctenomys sericeus.
Monogyropus parvus Ewing. (Argentina.)
Ctenomys, species.
Gyropus wetmorei Ewing. (Argentina.)
Ctenomys, species.
Gyropus forficulatus Neumann. (Argentina.)
Dactylomys amblyonx.
Gliricola decuratus (Neumann).[4] (Brazil.)
Hoplomys gymnurus.
Tetragyropus setifer Ewing. (Ecuador.)
Proëchimys mincae.
Tetragyropus lineatus (Neumann). (Colombia.)
Proëchimys securus.
Allogyropus setosus (Neumann).

SCIURIDAE.

Arctomys marmotta.
Allogyropus turbinatus (Piaget). (Europe.)

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[2] This species is included in the subfamily *Gyropinae*, but its generic affinities may not be with the genus *Gyropus* Nitzsch.

[3] Straggler (?).

[4] This species may belong to the genus *Paragliricola* Ewing. Only further study will tell.

PRIMATES.

CEBIDAE.

Aotes boliviensis.
Tetragyropus aotophilus Ewing. (Bolivia.)

UNGULATA: ARTIODACTYLA.

TAGASSUIDAE.

Dicotyles torquatus (a peccary).
Macrogyropus dicotylis (Macalister). (Locality?.)
Pecari angulatus crusnigrum (Chiriqui collared peccary).
Macrogyropus dentatus Ewing. (Nicaragua, Costa Rica.)

CATALOGUE OF THE GYROPIDAE.

Subfamily PROTOGYROPINAE.

Genus PROTOGYROPUS Ewing.

P. normalis Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 8, pl. 1, fig. 1, and text figs. 2 and 3.

Subfamily GYROPINAE Ewing.

Genus MONOGYROPUS Ewing.

M. longus (Neumann). Bull. Soc. Zool. France, vol. 37, 1912, p. 222, figs. 9 and 10.

M. parvus Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 11, text fig. 5.

Genus GYROPUS Nitzsch.

G. alpinus Kellogg and Nakayama. Ent. News, vol. 25, 1914, p. 196, pl. 8.

G. forficulatus Neumann. Bull. Soc. Zool. France, vol. 37, 1912, p. 220, figs. 6–8.

G. gracilipes Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 18, text fig. 7.

G. latipollicaris Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 17, pl. 1, fig. 4.

G. ovalis Nitzsch. Burmeister's Handbuch, vol. 2, 1838, p. 443.

G. pollicaris Ewing. Proc. U. S. Nat. Mus., vol. 63. 1924, p. 16, pl. 1, fig. 3.

G. wetmorei Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 19, text figs. 8 and 9.

Genus ALLOGYROPUS Ewing.

A. amplexans (Neumann). Bull. Soc. Zool. France, vol. 37, 1912, p. 224, figs. 11–13.

A. setosus (Neumann). Arch. Paras., vol. 15, 1912, p. 372, fig. 18.

A. turbinatus (Piaget). Pediculines, 1880, p. 612, pl. 50, fig. 7.

Genus TETRAGYROPUS Ewing.

T. aotophilus Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 23, text fig. 11.

T. lineatus (Neumann). Bull. Soc. Zool. France, vol. 37, 1912, p. 218, figs. 4 and 5.

T. setifer Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 22, text fig. 10.

Genus MACROGYROPUS Ewing.

M. dentatus Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 26, pl. 1, fig. 5.

M. dicotylis (Macalister). Proc. Zool. Soc. London, 1869, p. 420.

Genus HETEROGYROPUS Ewing.

H. heteronychus Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 27, text figs. 2 and 12, pl. 1, fig. 6.

Subfamily GLIRICOLINAE Ewing.

Genus PARAGLIRICOLA Ewing.

P. quadrisetosa Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 30, text figs. 13 and 14; pl. 1, fig. 7.

Genus GLIRICOLA Mjöberg.

G. distincta Ewing. Proc. U. S. Nat. Mus., vol. 63, 1924, p. 32, text fig. 16.
G. porcelli (Linnaeus). Syst. Nat., 1758, p. 611.
G. porcelli perfoliata (Neumann). Bull. Soc. Zool. France, vol. 37, 1912, p. 216.

UNPLACED SPECIES.

Subfamily GYROPINAE Ewing.

Gyropus hispidus Nitzsch. Burmeister's Handbuch, vol. 2, 1838, p. 443.
Gyropus lagotis Gervais. Gay's Hist. Chile, 1849, p. 103

Subfamily GLIRICOLINAE Ewing.

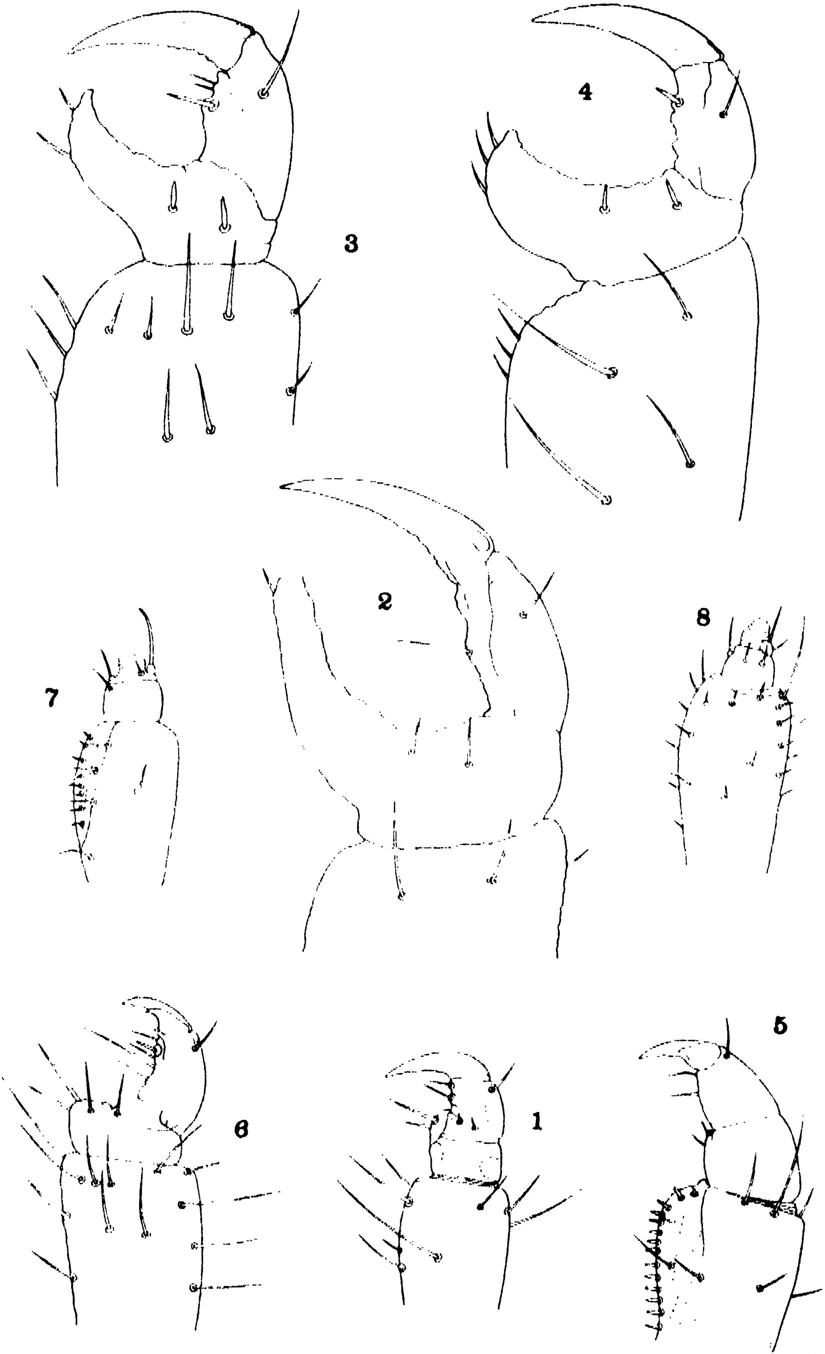
Gyropus decuratus Neumann. Bull. Soc. Zool. France, vol. 37, 1912, p. 216, fig. 3.
Gyropus longicollis Nitzsch. Burmeister's Handbuch, vol. 2, 1838, p. 443.

EXPLANATION OF PLATES.

PLATE 1.

Ventral views of the left tarsus of the anterior legs of some of the different species of Gyropidae. All magnified 500 diameters.

FIG. 1. *Protogyropus normalis*, female.
2. *Gyropus forficulatus*, male.
3. *Gyropus pollicaris*, male.
4. *Gyropus latipollicaris*, male.
5. *Macrogyropus dentatus*, female.
6. *Heterogyropus heteronychus*, female.
7. *Paragliricola quadrisetosa*, female.
8. *Gliricola porcelli*, female.



Ventral Views of the Left Tarsus of the Anterior Pair of Legs of Some of the Different Species of Gyropidae.

For explanation of plate see page 42.

NOTES AND DESCRIPTIONS OF TWO-WINGED FLIES OF THE FAMILY DOLICHOPODIDAE FROM ALASKA.

By M. C. VanDuzee.

Of Buffalo, New York.

The insects herein described or otherwise noted were collected in Alaska during 1921 by J. M. Aldrich, and the types of all the new species are in the National Museum.

Genus DIAPHORUS Meigen.

Diaphorus Meigen, Syst. Besch., vol. 4, p. 32, 1824.—Schiner, Fauna Austriaca, vol. 1, p. 186, 1864.—Loew, Smiths. Misc. Colls., No. 171, 1864, p. 156.—Wheeler, Psyche, vol. 5, pp. 359–360, 1890.—Aldrich, Diptera of St. Vincent, Trans. Ent. Soc. London, 1896, part 3, pp. 320–324; Kansas univ. sci. Bull., 1902, vol. 1, pp. 85–87.—VanDuzee, Bull. Buffalo Nat. Sci., 1915, vol. 11, pp. 161–194; Psyche, vol. 24, pp. 33–39, 1917.

DIAPHORUS PALPIGER Wheeler.

Diaphorus palpiger Wheeler, Psyche, vol. 5, p. 360, 1890.—VanDuzee, Bull. Buff. Soc. Nat. Sci., vol. 11, p. 189, 1915.

Ten males and females were taken at Anchorage, Alaska, June 14, and July 19 and 21. Described from Wisconsin. Found all over North America.

DIAPHORUS OCCIDENTALIS VanDuzee.

Diaphorus occidentalis VanDuzee, Bull. Buffalo Soc. Nat. Sci., vol. 11, p. 180, 1915.

One male taken at Fairbanks, Alaska, June 30. Described from Oregon; I took many of them in California and have seen specimens from New Mexico.

DIAPHORUS GIBBOSUS VanDuzee.

Diaphorus gibbosus VanDuzee, Bull. Buffalo Soc. Nat. Sci., vol. 11, p. 173, 1915.

One male taken at Anchorage, Alaska, June 13. Described from the Northeastern United States and Ontario. I took several in California. The color of the abdomen varies, in some it is velvety black, while in others it is quite metallic. The thorax is always dark metallic green posteriorly.

DIAPHORUS FUSCUS VanDuzee.

Diaphorus adustus VanDuzee, Bull. Buffalo Soc. Nat. Sci., vol. 11, p. 172, 1915, von Wiedemann.

Diaphorus fuscus VanDuzee, Psyche, vol. 28, p. 122.

Ten specimens taken at Anchorage, Alaska, July 13–19. Described from Idaho and Nevada.

DIAPHORUS BREVINERVIS, new species.

Male.—Length, 2 mm. Face rather narrow with white pollen. Palpi black, small. Front green, dulled with white pollen. Antennae black; third joint small, somewhat conical and pointed at tip; arista apical; its first joint is not cylindrical but a little spindle shaped. Lateral and inferior orbital cilia white.

Thorax and abdomen dark green, dulled with gray pollen, hairs of the latter small, white. Hypopygium small, no bristles at tip; there appears to be a lamella-like brown appendage projecting backward, which has several small bristles on its disk.

Coxae, legs, and feet wholly black, knees narrowly yellowish. Fore tarsi as long as their tibiae, first joint as long as the remaining four taken together, pulvilli distinctly enlarged. Fore femora with several bristles below near the tip. Middle tibiae with one slender bristle near the base on anterior side; hind tibiae with several small bristles. Calypters, their cilia and the halteres yellow.

Wings tinged with brownish gray; third and fourth veins parallel, the latter ending in the apex of the wing, first vein reaching only about one-fourth the distance to the tip of second; last section of fifth vein nearly four times as long as the cross vein; anal angle prominent, making the wing of rather equal width; it is not at all wedge shaped.

Female.—Face and front a little wider; antennae with the third joint slightly smaller, arista apical; all tibiae yellow, still the hind pair are a little infuscated and black at tip; hind tarsi wholly black; first joint of fore and middle tarsi yellow. Cilia of the calypters whitish. Wings grayish, first vein reaching slightly further than in the male; last section of fifth vein as in the male.

Described from one male taken at Fairbanks, Alaska, July 1; the female was taken at Nenana, Alaska, June 28.

Type.—Male. Cat. No. 25955, U.S.N.M.

Although these were not taken together, I think there is no doubt of their belonging to the same species, the shape of the third antennal joint, general color, and venation being about alike in both specimens.

Genus CAMPSICNEMUS Walker.

Campsicnemus WALKER, Insects in Brit. Museum, Diptera, vol. 2, p. 193, 1851.—LOEW, Neue Beitr., vol. 5, p. 26, 1857; Smiths. Misc. Colls, No. 171, p. 193, 1864.—WHEELER, Proc. Calif., Acad. Sci., vol. 2, pp. 58–62, 1899.—VANDUZEE, Ent. News, vol. 28, pp. 124–126, 1917.—BECKER, Nova Acta, vol. 14, pt. 2, pp. 82–99, 1918.

CAMPSICNEMUS CLAUDICANS Loew.

Campsicnemus claudicans LOEW, Smiths. Misc. Colls, No. 171, p. 194.

Three females were taken; one at Anchorage, Alaska, June 11, one at Healy, June 26, and one at Port Althorp, June 5. This was described from Alaska. All the females I have seen have the legs more infuscated than Doctor Loew's description would indicate, and the fore coxae are almost wholly black.

CAMPSICNEMUS DEGENER Wheeler.

Campsicnemus degener WHEELER, Proc. Calif. Acad. Sci., vol. 2, p. 58, 1899.

Two males taken at Fairbanks, Alaska, July 1. Described from California.

CAMPSICNEMUS CALCARATUS, new species.

Male.—Length 2.75 mm. Face, palpi, proboscis, and front blackish; eyes touching on the middle of the face. Antennae (fig. 6) black; third joint small, about as long as wide, rounded at tip, arista dorsal, long and pointed. Orbital cilia minute, pale below.

Thorax and abdomen bronze brown, dulled with gray pollen; scutellum blue with two long marginal bristles. Hypopygium small, with no visible appendages, except one long and several short yellow hairs below.

Coxae, femora, tibiae and tarsi black, knees a little yellowish; fore coxae with a row of four slender bristles near the tip. Middle and hind femora each with a few black bristles below on apical half, those on the middle pair twice as long as those on the posterior ones. Middle tibiae slightly compressed, of nearly equal width throughout, a little arcuated and then recurved at tip (fig. 4), fringed with long hairs and bristles, which appear yellow in certain lights. Middle basitarsus curved, terminating in a horn-like point, the second joint being inserted on the first some distance before its tip. Second joint of hind tarsus longer than first. Halteres black.

Wings dark grayish, more brown in front; third and fourth veins quite widely separated, parallel, the fourth ending just back of the apex of the wing; anal angle prominent, the wing being of rather equal width.

Described from one male taken at Fairbanks, Alaska, July 1.

Type.—Male, Cat. No. 25956, U.S.N.M.

This is something like *thersites* Wheeler, but differs in having the tibiae of different form, and the legs and feet wholly black, while in *thersites* the legs and feet are largely yellow; the middle basitarsus is less bent in this form.

CAMPSICNEMUS AMERICANUS, new species.

Male.—Length, 2 mm.; of wing, 2.5 mm. Face narrow, yellow above the suture which divides it near apical fourth, this short lower portion and the palpi being black and thickly covered with gray pollen. Front blackish, dull. First antennal joint yellow, second and third black; third nearly twice as long as wide (fig. 5), rounded at tip; arista dorsal, nearly as long as the height of its head, its tip feathered with longer white hairs, giving it the appearance of having the tip a little enlarged and white. Lower orbital cilia quite long, white.

Thorax and abdomen bronze green, sometimes almost black; scutellum bluish; hairs of the abdomen small and pale, bristles on hind margins of segments black; fifth segment considerably enlarged below. Hypopygium small and without visible appendages, except a black central filament.

Fore coxae yellow, middle and hind ones wholly black; hairs on the coxae yellow. Fore femora a little thickened, yellow on lower half or more, upper part blackish, these colors sharply defined (fig. 3); their tibiae yellow with six erect, flattened, pale bristles above on basal half, and a row of long hairs on each side of the dorsal surface. Fore tarsi wholly black; first two joints short, about as long as wide, first with a stiff bristle above, second with a very long narrow appendage which is not much shorter than the whole tarsus and is fringed with very long hairs; third joint as long as fifth, of about equal thickness throughout and fringed above with about six very long hairs, below with shorter hairs; fourth joint about twice as long as wide, its tip prolonged into a blunt point below, it has three very long hairs above and several shorter hairs below; fifth very slender, with about six very long hairs above and shorter ones below; claws long, spreading out more than usual. Middle and hind femora yellow, knees blackish. Middle tibiae mostly black or brown, still a little yellow, especially near the base; posterior tibiae yellow with extreme base and tip brown, both with several slender bristles. Middle and hind tarsi wholly black. Calypters, their cilia, and the halteres yellow.

Wings dark grayish, more brown in front of fifth vein, especially along the veins; third and fourth veins parallel, the latter ending in the apex of the wing; last section of fifth vein a little longer than the cross vein; anal angle rather prominent.

Female.—Wings and body color about as in the male. Face wholly grayish; first antennal joint yellow below, black above; third joint smaller than in the male; arista plain; legs and feet normal; fore coxae black with their inner surface and tips yellow; fore femora black with broadly yellow tips; middle and hind femora yellow with their upper edge more or less blackened; all tibiae and tarsi appear black in certain lights, viewed at other angles the tibiae appear a little yellowish; cilia of the calypters black.

Described from three males and three females; two males and one female were taken at Healy, June 26; the others at Anchorage, June 15.

Type.—Male. Cat. No. 25957, U.S.N.M., from Healy.

In general appearance and the color of the antennae this is very much like the European species *compeditus* Loew, but that species has no flattened bristles on fore tibiae; the third joint of fore tarsi is somewhat different, and it has no long bristles on third and fourth joints, and the fifth joint is almost wholly bare. I have not seen the European species, but am judging from Doctor Becker's figure and description; the latter is rather meager.

Genus ARGYRA Macquart.

Argyra MACQUART, Hist. Nat. Diptera, vol. 1, p. 456, 1834.—LOEW, Smiths. Misc. Colls., No. 171, pp. 128–132, 1864.—BECKER, Nova Acta, vol. 104, pt. 2, pp. 61–74, 1918.

ARGYRA CILIATA, new species.

Male.—Length 5 mm. Face narrow, velvety black. Front black, somewhat shining. Palpi black with pale hairs and one slender black bristle. Proboscis black, more yellowish on the edge, its hairs pale. Antennae black, first joint nearly as long as third, with many stiff hairs above; third joint obtusely pointed at tip; arista subapical, a little longer than the antennae. Lower orbital cilia whitish, upper half of orbits nearly bare, except a few very minute black hairs at top.

Thorax shining green with a coppery line on each side of the acrostichal bristles; scutellum blue with four large marginal bristles; pleurae with silvery white pollen which extends over the humeri. Abdomen black with slight green reflections, thickly covered with silvery white pollen, second segment with a large yellow spot on each side; short hairs on the dorsum black, the long hairs on the sides yellow; first segment with a row of long black bristles on posterior margin and a cluster of stiff yellow hairs on each side. Hypopygium and its appendages black; the outer lamellae somewhat lanceolate, projecting downward, with many black bristles on posterior edge; there are two black bristles as long as the height of the hypopygium and several shorter ones on the posterior surface of the hypopygium; the inner appendages are a pair of sharp-pointed, slightly curved hornlike organs.

Coxae black with yellow tips; fore and middle pairs with partly black and partly yellow hairs; hind ones with one large and two small bristles on outer surface. Fore and middle femora blackened on basal half or more, still the yellow reaches nearly to the base on the front side of middle pair; they are ciliated below with long yellowish hairs, which are longer than their width; the anterior ones also have long black hair on posterior surface. Hind femora yellow with more than apical third black, and with a row of long, black, stiff hairs on lower outer edge, the longest of which are nearly twice as long as the width of the femora. Tibiae yellow, posterior pair with apical third black, their upper surface with long black hair; fore tibiae with several slender bristles on outer upper edge, the middle ones also with a few small scattered ones. All tarsi as long as their tibiae; anterior pair yellow, the last two joints blackened above, first joint as long as the remaining four taken together and having on entire lower edge a row of small black bristles, which are fully as long as the diameter of the joint. Middle tarsi with the first joint about as long as the remaining four taken together, infuscated from the second joint. Hind tarsi entirely black, second joint about three-fourths as long as the first, which has longer hair on the outer surface. Calypters yellow with black tips and yellow cilia, still some of the hairs appear brown in certain lights. Halteres yellow, their stem darker.

Wings nearly hyaline, veins black; third vein bent backward; last section of fourth vein rather abruptly bent at its middle, parallel with third toward the tip, ending just back of the apex of the wing; last section of fifth vein nearly twice as long as the cross vein.

Female.—One female taken at Fairbanks July 4 seems to belong to the same species as the male described above. It has the face and front wide, covered with coarse yellowish gray pollen, the former with its suture near apical third, its lower edge rounded. Antennae with the third joint but little longer than wide: first joint as long as third, with many hairs above. Thorax almost black, with thick coarse yellowish gray pollen which conceals the ground color on much of the fore part of the dorsum; scutellum with four large marginal bristles and distinct hairs on its disk. Abdomen depressed, almost without yellow on its sides, coppery, darker on the sides; its hairs, including the long ones on the sides of first segment, black. Hairs of the coxae and legs largely black. Fore and middle femora black with their tips broadly yellow; they have a few small, pale hairs below, the anterior pair with rather long black hair on their posterior surface. Hind femora yellow with apical third black. All tibiae yellow, hind ones with apical sixth black. Fore and middle tarsi black from the tip of the first joint, which is as long as the last four joints taken together. Hind tarsi and the calypters as in the male. Wings grayish, veins black; venation as in the male, except that the third vein is not bent backward quite as much.

Described from one pair taken at Fairbanks, Alaska, July 2 and 4.

Type.—Male, Cat. No. 25958, U.S.N.M.

Genus PORPHYROPS Meigen.

Porphyrops MEIGEN, Syst. Beschr., vol. 4, p. 45, 1824.—SCHINER, Fauna Austriaca, vol. 1, p. 196, 1862.—LOEW, Smiths. Misc. Colls., No. 171, pp. 142–146 and 340, 1864.—WHEELER, Proc. Calif. Acad. Sci., vol. 2, pp. 33–35, 1890.—BECKER, Nova Acta, vol. 103, pt. 3, pp. 208–229, 1918.—LUNDBECK, Diptera Danica, pt. 4, pp. 252–271, 1912.

PORPHYROPS ELEGANTULA Meigen.

Porphyrops elegantula MEIGEN, Syst. Beschr., vol. 4, p. 51, 1824.—LUNDBECK, Diptera Danica, pt. 4, p. 260, 1912.

One female taken at Fairbanks, Alaska, June 30. Described from Europe. I have seen several males and females taken by Prof. James S. Hine in Alaska; it was from his material that I was able to determine the species.

PORPHYROPS CRASSIPES Meigen.

Porphyrops crassipes MEIGEN, Syst. Beschr., vol. 4, p. 50, 1824.

Porphyrops fulvipes MEIGEN, Syst. Beschr., vol. 7, p. 151, 1838 (female).

Porphyrops crassipes LUNDBECK, Diptera Danica, pt. 4, p. 264, 1912.

Four males and six females were taken by Doctor Aldrich in Alaska at the following places: Skagway, June 3; Valdez, June 8; Nenana, June 22; Fairbanks, July 1, 2. Described from Europe.

PORPHYROPS DISCOLOR Zetterstedt.

Rhaphium discolor ZETTERSTEDT, Insecta Lapponica, p. 704.8, 1838 (female).

Rhaphium consobrinum ZETTERSTEDT, Diptera Scan., vol. 2, p. 471, 1843 (male and female).

Porphyrops discolor ZETTERSTEDT, Becker, Nova Acta, vol. 103, pt. 3, p. 217, 1912.—COQUILLETT *Porphyrops consobrina* Zetterstedt, Harriman Alaska Exp., Insects, vol. 9, p. 40, 1899.

Seven males and five females were taken in Alaska at the following places: Skagway, June 4; Healy, June 23; Nenana, June 28; and Anchorage, June 10 and July 1. Described from Lappland.

According to Doctor Becker the female of this species was described as *discolor* in 1838, and both sexes were described in 1843 under the name of *consobrina*. Under this last name Mr. Coquillett reported the species as occurring in Alaska in 1899.

PORPHYROPS TERMINALIS, new species.

Male.—Length, 4.5 mm. Face very narrow, black. Palpi and proboscis black. Front usually steel blue, sometimes green, not very bright. Antenna (fig. 8) black; third joint scarcely more than half as long as the face; arista nearly twice as long as third joint. Hairs of the eyes brown. Beard black, abundant.

Thorax green, rather dull, its posterior slope and the scutellum usually steel blue, the latter with two pair of marginal bristles, the outer pair half as long as the median ones. Abdomen green, the last two segments usually more purple; hairs on its dorsum black, those on the basal edge of first segment and the long ones on the sides of first and second segments yellowish; venter black, its hairs white. Hypopygium (fig. 11) of moderate size, black; its outer lamellae long, tapering, ribbonlike, brown, fringed on the edge and one side with long pale hairs; inner appendages a little paddle-shaped, testaceous, with four minute spines near the middle on one edge.

Coxae wholly black, anterior pair shining on posterior surface, the anterior half dull with black hairs, those along the outer edge of anterior side pale; middle and hind coxae with pale hairs, the former with a black thorn at tip. All femora black, fore and middle ones with yellow tips; outer surface of fore femora with long black hair above and a row of slender black bristles below, there are a few long pale hairs between these bristles and the black hair above. Middle femora with a few pale hairs at base below and three long, slender, black preapical bristles on posterior side and one on anterior side;

hind ones with one very small preapical bristle, their hair short, except a few longer hairs at base above. Fore and middle tibiae brown at base, apical half yellow, their bristles long, middle ones with a row of four bristles on lower anterior edge. Hind tibiae black at base and tip, still mostly yellowish, sometimes only the extreme base infuscated, their bristles rather strong. Fore tarsi a little longer than their tibiae; first joint a little enlarged at tip and extending beyond the base of second joint, which is slightly compressed, except at tip, of about equal width, three-fourths as long as first; fourth and fifth of about equal length and taken together about as long as third. Middle tarsi black from the tip of the first joint, still sometimes the second is yellowish at base. Hind tarsi wholly black, with the first and second joints of about equal length. Calypters, their cilia, and the halteres pale yellow.

Wings grayish, veins brown or yellowish; third vein bent backward, at tip it is a little recurved forward; last section of fourth vein bent beyond its middle, nearly parallel with third toward its tip, ending in the apex of the wing; last section of fifth vein nearly one and one-third times as long as the cross-vein.

Female.—Face broad, its pollen coarse and yellowish; suture near the center of its length, lower portion with oral edge rounded, and with the metallic green ground color showing through the pollen. Antennate small, third joint not longer than wide. Beard white, rather abundant on the sides. Thorax with the posterior part of the dorsum more or less coppery red. Hairs on the dorsum of the abdomen mostly whitish, those on the sides of first and second segments moderately long, white. Fore coxae with white hairs. Fore femora black or green with their tips broadly yellow, and sometimes yellow below, their posterior surface with rather long white hair and several small black bristles near the tip. Middle and hind femora yellow, the latter more or less blackened at tip, at least above, and with one small preapical bristle; middle ones with two or three preapical bristles on each side. All tibiae yellow; posterior ones blackened a little at base and tip; middle ones with two bristles on anterior surface. Fore tarsi as long as their tibiae, darkened toward their tip, last joint black, second joint a little more than half as long as first, last three joints of about equal length, still the fourth a little the shortest. Middle tarsi blackened from the tip of the first joint, which is as long as the three following taken together; fourth shorter than fifth. Hind tarsi wholly black, first and second joints of equal length.

Described from seven males and seven females. Five males were taken at Fairbanks, July 1–4; one at Nenana, June 28, and one at Anchorage, June 15; five females were taken at Anchorage, June 18–28; one at Skagway, June 4, and one at Nenana, June 28.

Type.—Male, Cat. No. 25959, U.S.N.M.

Type and allotype were taken at Nenana, Alaska, June 28, 1921.

This species has the appendages of the hypopygium very much like those of *elegantula* Meigen, but is smaller, duller, the legs are much more blackened and the hair on fore coxae is mostly black in this form while in *elegantula* it is whitish; they also differ in other points.

PORPHYROPS BOREALIS, new species.

This form has the head parts, the outer hypopygial lamellae and general color as in *terminalis*, new species; it differs in having the hair on the fore coxae and posterior surface of the fore femora wholly black and longer; middle tibiae wholly yellow; the hind tibiae wholly black on its lower edge, and the inner appendages of the hypopygium very small with a short hair (almost spine-like) at tip.

Type and paratype.—Males, Cat. No. 26340, U.S.N.M. There are additional paratypes in a series from Savonoski, Naknek Lake, Alaska, collected in June and July by Prof. James S. Hine; I have given a fuller description of this species in a paper on his collections, not yet published.

PORPHYROPS NUDUS, new species.

Male.—Length 4–4.75 mm.; of wing 3.25–4 mm. Face very narrow, black. Front green. Palpi black with brownish yellow hairs. Antennae black; third joint a little longer than the two basal ones taken together; arista a little longer than the antenna. Beard long and abundant, brown or black.

Thorax and scutellum bright green or blue-green, scutellum with two pairs of marginal bristles, the outer pair half as long as the median ones. Abdomen bright green, its hairs mostly pale, they are long on the sides of first three segments; there are no black bristles in the hind margin of first segment except two very small ones on each side nearly on the dorsum. Hypopygium black, upper portion dull and covered with pale hairs, lower part more shining, deeply emarginate on lower edge so as to form a short flap on each side of the lamellae; outer lamellae (fig. 9) yellowish brown, wide just above the stem, forked, somewhat U-shaped, with one arm only about half as long as the other; inner appendages are a pair of yellowish, nearly straight still a little curved, slender, finger-like organs, they are about as long as the width of the lamella just before the fork, and seem to have minute hairs on the edges.

Coxae black; anterior pair with long black hair, those at base on outer corner appear more yellowish red in certain lights; middle and hind ones with a few white hairs, the former with a black thorn at tip. Femora black with extreme tips yellowish; anterior pair with pale hairs on posterior surface; middle ones with a few long pale hairs at base below and three preapical bristles on posterior side and one in front; posterior pair with one small preapical bristle, their hair rather short. Fore tibiae yellow, blackened on upper edge.

with two rows of large bristles; middle pair yellow, their base brown, usually distinctly so for one-third their length, they have one bristle below and two rows of long ones above. Hind tibiae black with upper edge a little yellowish. Fore tarsi yellow, darkened at tip; first two joints of nearly equal length, covered with minute yellow hairs, both with their tips enlarged. Middle tarsi yellowish, tips cf the joints dark. Hind tarsi black with first and second joints of nearly equal length. Calypters, their cilia and the halteres pale yellow.

Wings nearly hyaline; third vein gently bent backward at tip; last section of fourth vein bent near its middle, parallel with third at tip; last section of fifth vein scarcely more than one and a half times as long as the cross-vein.

Female.—What I take to be the female of this species has its face wide, the pollen of the face white, sometimes a little yellowish on upper portion, the suture just below the center, its oral edge a little pointed in the middle. Front green with considerable white pollen. Antennae small, about as long as wide; arista about three times as long as the antenna. Beard white, rather abundant on the sides. Abdomen with black hairs on the dorsum, those on the sides pale, long on the first two segments. Thorax with a spot of white pollen back of the humeri. Fore coxae with pale hair. Femora black with yellow tips, anterior ones with rather long pale hair on posterior surface; middle ones with a few pale hairs at base below, three preapical bristles on posterior and one on anterior surface; hind femora with the one preapical bristle. Tibiae yellow; hind ones slightly brownish at tip; middle tibiae with a row of three long bristles on lower anterior edge. Fore tarsi mostly yellowish, middle ones more brownish almost to their base, hind ones wholly black with their first and second joints of equal length. Wings about as in the male, except that they are dark grayish.

Described from 5 males and 16 males taken at Fairbanks, July 1–4.

Type.—Male, Cat. No. 25960, U.S.N.M.

PORPHYROPS ALBIBARBA, new species.

Male.—Length, 4 mm.; of wing the same. Face narrow, silvery white. Palpi velvety black, edged with white pollen, and with a few small black hairs. Front steel-blue, dull. Antennae black (fig. 7); third joint about as long as the face, rather slender toward the tip; arista slightly more than half as long as the antenna, its first joint short. The long black orbital cilia reaching down to upper fourth of eye height, below these the long, dense beard is sordid white.

Thorax blue-green, dulled with gray pollen; dorsum with the usual brown stripe on each side of the acrostichal bristles; scutellum with one pair of long bristles, two pair of small ones between them, and three pair of long hairs basally on its margin, and two small black hairs on the disk; propleurae with long white hairs. Abdomen metallic green, dulled with gray pollen, hairs on the dorsum black, those on the sides of the first three segments and extending onto the dorsum of first are yellowish and on the lower edge long and dense. Hypopygium (fig. 10) black, rather small, upper half dull, lower part shining; outer lamellae somewhat triangular, black, fringed with long pale hairs, they are scarcely as long as the height of the hypopygium; inner appendages long and shining black, pointed, extending forward under the abdomen; they have several delicate hairs on upper surface.

Coxae, legs and feet wholly black, except extreme tip of fore tibia, apical half of middle tibia and base of fore and middle basitarsi, which are yellowish. All coxae with long whitish hair, that on the anterior pair very dense; middle pair with a thorn of black bristles at tip. All femora fringed with long whitish hairs on lower posterior surface, those on middle pair not so numerous but on the others very abundant; posterior ones also have besides those already mentioned a few pale hairs on lower outer edge ending with one or two black ones and with a small black preapical bristle. Tibiae with numerous bristles on upper surface, those on posterior ones more scattering. Fore tarsi as long as their tibiae, first joint as long as the three following taken together, second, third, and fourth each a little shorter than the preceding one; fourth, and fifth of about equal length; fore basitarsus considerably enlarged below at tip. Hind tarsi stout, scarcely as long as their tibiae, first and second joints of equal length. Calypters and stem of halteres brownish, cilia of the former whitish, knobs of halteres yellow.

Wings tinged with brownish gray, darkest in the middle of the cells, a hyaline spot surrounds the cross-vein and extending somewhat along the upper edge of the fifth vein; last section of fourth vein bent at its middle; third vein bent at about the same distance from its tip so as to approach fourth and about parallel with it near their tips, fourth ending in the apex of the wing; first vein reaching about half the distance to the cross vein; last section of fifth vein twice as long as the cross vein.

Described from one male taken at Anchorage, July 21.

Type.—Male, Cat. no. 25961, U.S.N.M.

PORPHYROPS, species.

Thirteen females were taken which I am not able to determine.

Genus XIPHANDRIUM Loew.

Xiphandrium **Loew**, Neue Beitr., vol. 5, p. 36, 1857.—**Becker**, Zoologisch-Botanische Gesellschaft, Wien, vol. 8, Heft 1, p. 150, 1921.—Van Duzee, Trans. Amer. Ent. Soc., vol. 48, pp. 79, 1922.

XIPHANDRIUM FEMORATUM VanDuzee.

Xiphandrium femoratum VANDUZEE, Trans. Amer. Ent. Soc., vol. 48, p. 81, 1922.

Twenty-two specimens, both sexes, were taken by Doctor Aldrich in Alaska at the following places: Skagway, June 4; Anchorage, June 10–13; Healy, June 21; and Fairbanks, July 1. This is part of the material from which the species was described, the other specimens were taken in Nevada and Alaska. Type from Wells, Nevada.

Paratypes.—Male and female, Cat. No. 26341, U.S.N.M.

XIPHANDRIUM FEMORATUM, variety POLLEX VanDuzee.

Xiphandrium femoratum, var. *pollex* VANDUZEE, Trans. Amer. Ent. Soc., vol. 48, p. 82, 1922.

One male was taken at Skagway, Alaska, June 4. This is part of the type material.

Paratype.—Male, Cat. No. 26342, U.S.N.M.

XIPHANDRIUM ALDRICHI VanDuzee.

Xiphandrium aldrichi VANDUZEE, Trans. Amer. Ent. Soc., vol. 48, p. 86, 1922.

Described from two males and one female taken by Doctor Aldrich at Healy, Alaska, June 24.

Type.—Male, Cat. No. 26393, U.S.N.M.

Genus SYMPYCNUS Loew.

Sympycnus LOEW, Neue Beitr., vol. 5, p. 24, 1857; Smiths. Misc. Colls., No. 171, pp. 185–191, 1864.—ALDRICH, Kansas Univ. Bull., vol. 1, pp. 83–84, 1902; Biologia Cent. Amer. Diptera, vol. 1, p. 344, 1901; Trans. Ent. Soc. London, 1896, pt. 3, p. 336.—WHEELER, Proc. Calif. Acad. Sci., vol. 2, pp. 47–51, 1899.—VANDUZEE, Ent. News, vol. 24, pp. 269–272, 1913; Can. Ent., vol. 49, pp. 337–339, 1917.

SYMPYCNUS CUPRINUS Wheeler.

Sympycnus cuprinus WHEELER, Proc. Calif. Acad. Sci., vol. 2, p. 50, 1899.—COQUILLETT, Proc. Wash. Acad. Sci., vol. 2, p. 426, 1900.

Fourteen specimens were taken by Doctor Aldrich in Alaska. This species was described from California; it was reported from Alaska by Coquillett in 1900.

SYMPYCNUS, species.

One female representing a new species was taken.

Genus NOTHOSYMPYCNUS Wheeler.

Nothosympycnus WHEELER, Proc. Calif. Acad. Sci., vol. 2, pp. 51–56, 1899.—VANDUZEE, Can. Ent., vol. 49, pp. 140 and 141, 1917.

NOTHOSYMPYCNUS CILIFEMORATUS, new species.

Male.—Length 3 mm. Face narrow below, covered with white pollen. Front blackish, dulled with brown or grayish pollen, sometimes dark blue near the orbits. Antennae (fig. 2) black; third joint rounded at tip; arista stout, nearly as long as the thorax, tipped with a large roundish lamella. Lower orbital cilia pale.

Thorax and scutellum bronze brown with more or less blue reflections; dorsum dulled with brown pollen; pleurae with white pollen. Abdomen metallic green, sometimes almost black, sides of second segment and the venter more or less yellow; hair on the abdomen and bristles on sides of first segment yellow. Hypopygium rather large, black with small black appendages and two slender filaments extending backward (probably the penis and its sheath).

All coxae yellow, middle pair darkened on outer surface, hairs on fore coxae yellow; the slender erect bristle on hind coxa black, still it appears yellow in certain lights. All femora yellow, the apical half of posterior pair more or less black; middle and hind femora each with a small preapical bristle, the latter with long yellow hairs on the lower edge of both inner and outer surface, which are longer and more brown apically. Fore and middle tibiae yellow, slender, with yellow hairs, middle ones with two slender bristles on upper anterior edge. Hind tibiae blackish, sometimes slightly yellow at base, their hairs yellow, bristles black. Fore tarsi (fig. 1) yellow, black from the tip of second joint; first joint short, about as long as wide; second longer than the remaining three taken together; third and fifth of nearly equal length, fourth distinctly longer and a little curved. Middle tarsi black from the tip of first joint, which is as long as the three following taken together. Second and third of nearly equal length, each with several long hairs, fourth slightly shorter than third, fifth half as long as third. Hind tarsi wholly black, second joint slightly longer than first. Calypters, their cilia and the halteres yellow.

Wings grayish hyaline, tinged with brown in front of fourth vein; third and fourth veins very slightly convergent at their tips, fourth ending just before the tip of the wing; wing narrowed at base from a point nearly opposite the tip of the first vein.

Female.—Face wide, its pollen gray; antennae small, arista plain; fore tarsi blackened from the tip of the first joint, which is nearly as long as the remaining four taken togetrer, last four joints of slightly decreasing length; hind femora more or less infuscated at tip; fore femora slightly infuscated at base; middle and hind coxae blackened. Wings not narrowed at base.

Described from 13 males and 14 females. Eleven males and 11 females were taken at Anchorage, Alaska, June 15 to July 21; three females at Seward, Alaska, July 24, these were taken by Dr. J. M. Aldrich; two males and two females were taken at Grant, Colorado, August 19, by E. C. Jackson.

Type.—Male, Cat. No. 25962, U.S.N.M., from Anchorage.

Genus MEDETERUS Fischer.

Medeterus FISCHER VON WALDHEIM, Notice sur une Mouche carnivore, p. 10, Moscow, 1819.—MEIGEN, Syst. Beschr., vol. 4, p. 59, 1824.—LOEW, Smiths. Misc. Colls., No. 171, 1864, pp. 218–220.—KOWARZ, Verh. Zool-Bot. Ges., vol. 27, 1877, pp. 39–76.—WHEELER, proc. Calif. Acad. Sci., vol. 2, pp. 20–29, 1899.—ALDRICH, Kansas Univ. Sci. Bull., vol. 1, p. 91, 1902.—VAN DUZEE, Proc. Calif. Acad. Sci., vol. 9, pp. 257–270, 1919.

MEDETERUS VIDUUS Wheeler.

Medeterus viduus WHEELER, Proc. Calif. Acad. Sci., vol. 2, p. 24, 1899.

This was described from the State of Washington. A female taken at Healy, Alaska, July 7, no doubt is this species. It differs but little from the description of the single male specimen that Wheeler had. The long yellow hair on the hind tibiae mentioned by him are not found in this female, but there are short yellow hairs on the whole inner surface of the hind tibiae and tarsi. The last section of the fifth vein is only a little longer than the cross-vein, not one and a half times as long. Otherwise it agrees with Doctor Wheeler's description. I think there is no doubt of the determination.

MEDETERUS DISTINCTUS Van Duzee.

Medeterus distinctus VAN DUZEE, Proc. Calif. Acad. Sci., vol. 9, p. 266, 1919.

Two males and six females were taken at Anchorage, Alaska, June 10; one male at Seward, Alaska, June 25, and three males at Healy, Alaska, June 26. I can not separate these from our specimens taken in New York and New Jersey, one of which is the type of the species; the eastern specimens are females.

The male has the hypopygium pedunculate, rather long but not large, all its appendages are yellow, slender, and rather long; there are more or less black hairs on the dorsum of the abdomen. These males are from 2–3 mm. in length; the vittae on the thorax are less distinct than in the type, especially in the males.

Genus THRYPTICUS Gerstaecker.

Thrypticus GERSTAECKER, Stett. Ent. Zeit., vol. 25, p. 48, 1864.

Aphantotimus WHEELER, Psyche, vol. 5, p. 375, 1890.

Xanthotricha ALDRICH, Trans. Ent. Soc. London, 1896, pt. 3, pp. 339–340.

Thrypticus GERSTAECKER, Aldrich, Ent. News, vol. 9, p. 532, 1898; Biologia Cent. Amer., Diptera, vol. 1, p. 349, 1901.—WHEELER, Proc. Calif. Acad. Sci., vol. 2, p. 30, 1899.—VAN DUZEE, Psyche, vol. 22, pp. 84–87, 1915; Psyche, vol. 28, pp. 124–126, 1921.

THRYPTICUS FRATERCULUS Wheeler.

Aphantotimus fraterculus WHEELER, Psyche, vol. 5, p. 379, 1890.

Thrypticus fraterculus WHEELER, Proc. Calif. Acad. Sci., vol. 2, p. 31, 1899.—ALDRICH, Biologia Cent. Amer., Diptera, vol. 1, p. 349, 1901.—VAN DUZEE, Psyche, vol. 22, p. 84, 1915.

One female was taken at Fairbanks July 3. Described from Wisconsin; reported as taken in Ontario, the United States, and Mexico.

Genus HYDROPHORUS Fallén.

Hydrophorus FALLÉN, Diptera Sueciae, Dolichopodes, 1823, p. 2.—LOEW, Smiths. Misc. Colls., No. 171, p. 211.—ALDRICH, Psyche, vol. 17, pp. 45–73, 1 pl., 1911.

HYDROPHORUS INNOTATUS Loew.

Hydrophorus innotatus LOEW, Smiths. Misc. Colls., No. 171, p. 212, 1864.—MALLOCH, Rept. Canadian Arctic Exped., vol. 3, p. 50c, 1920.—ALDRICH, Psyche, vol. 18, p. 66, 1911; Proc. U. S. Nat. Mus., vol. 61, p. 17, 1922.

Four examples were taken at the following locations: Anchorage, Alaska, June 11; Seward, Alaska, July 24; Nenana, Alaska, June 28; Fairbanks, Alaska, June 30. Described from Sitka, Alaska. Since reported from several places in Alaska and from Washington and Oregon.

HYDROPHORUS CHRYSOLOGUS Walker.

Medeterus chrysologus WALKER, List, vol. 3, p. 655, 1849.—LOEW, Smiths. Misc. Colls., No. 171, pp. 215 and 309, 1864.—WHEELER, Proc. Calif. Acad. Sci., vol. 2, p. 63, 1899.—ALDRICH, Psyche, vol. 18, p. 62, 1911.

One female was taken at Healy, Alaska, June 26. This was described from Martin Falls, Canada; has been reported from several places in the Eastern States.

HYDROPHORUS MINIMUS, new species.

Male.—Length, 2.5 mm.; of wing, 3 mm. Face, blue-green on upper portion, suture near apical third, the lower part opaque with silvery white pollen, which is thin above the suture. Front, green with considerable brown pollen; occiput, green with the orbits white pollinose. Cheeks quite wide, truncate at lower edge. Antennae black; third joint small, about as long as wide, obtusely pointed at tip. Palpi black, covered with gray pollen. The short black orbital cilia not reaching the middle of the eye. Beard yellowish white, scanty.

Thorax brown, nearly opaque, still with some purple reflections; scutellum more purple, with four marginal bristles; prothorax with several yellow bristle-like hairs above fore coxae, without a black bristle. Abdomen metallic green, rather dull, hairs black on the dorsum, partly yellow, but short on the sides, bristles on the hind margin of last segment yellowish. Hypopygium small, its appendages but little exposed, fourth ventral segment extending downward and cut into on hind margin.

Fore coxae greenish with short pale hairs and one small black hair-like bristle at upper outer corner, without black bristles at tip. All femora and tibiae metallic green. Fore femora (fig. 12) a little thickened at base, with pale hairs below and a cluster of black spines near the base on lower front edge. Middle and hind tarsi blackish, plain, about as long as their tibiae, first joint longer than second; fourth and fifth joints of middle pair of nearly equal length; hind tarsi with the fourth joint shorter than fifth. Calypters and their cilia yellow. Halteres brown, their stem paler.

Wings grayish, tinged with brownish in front of fourth vein and along the cross-vein, without spots on fourth vein or cross-vein; third vein bent backward a little at tip; last section of fourth vein straight, ending back of the apex of the wing; last section of fifth vein a little more than half as long as the cross-vein.

Described from one male taken at Fairbanks, Alaska, July 1.

Type.—Male, Cat. No. 25963, U.S.N.M.

Genus HERCOSTOMUS Loew.

Hercostomus LOEW, Neue Beitr., vol. 5, p. 9, 1857; vol. 8, p. 42, 1861; Smiths. Misc. Colls., No. 171, p. 116, 1864.—WHEELER, Proc. Calif. Acad. Sci., vol. 2, p. 8, 1899.—MELANDER, Canadian Ent., vol. 32, p. 138, 1900.

HERCOSTOMUS UNICOLOR Loew.

Hercostomus unicolor LOEW, Smiths. Misc. Colls., No. 171, p. 117, 1864.—MELANDER, Canadian Ent., vol. 32, p. 138, 1900.

Gymnopternus poenitens WHEELER, Psyche, vol. 5, p. 336, 1890.

One female was taken at Healy, Alaska, June 27. Described from the "Hudson Bay Terr." It is found all over Canada and the northern part of the United States.

Genus PELASTONEURUS Loew.

Pelastoneurus LOEW, Neue Beitr., vol. 8, p. 36, 1861; Smiths. Misc. Colls., No. 171, pp. 108-109; 387-389, 1864.—WHEELER, Proc. Calif. Acad. Sci., vol. 2, pp. 11-17, 1899.—ALDRICH, Biologia Cent. Amer., Diptera, vol. 1, pp. 336-339; Trans. Amer. Ent. Soc., vol. 30, pp. 278-278, 1804.

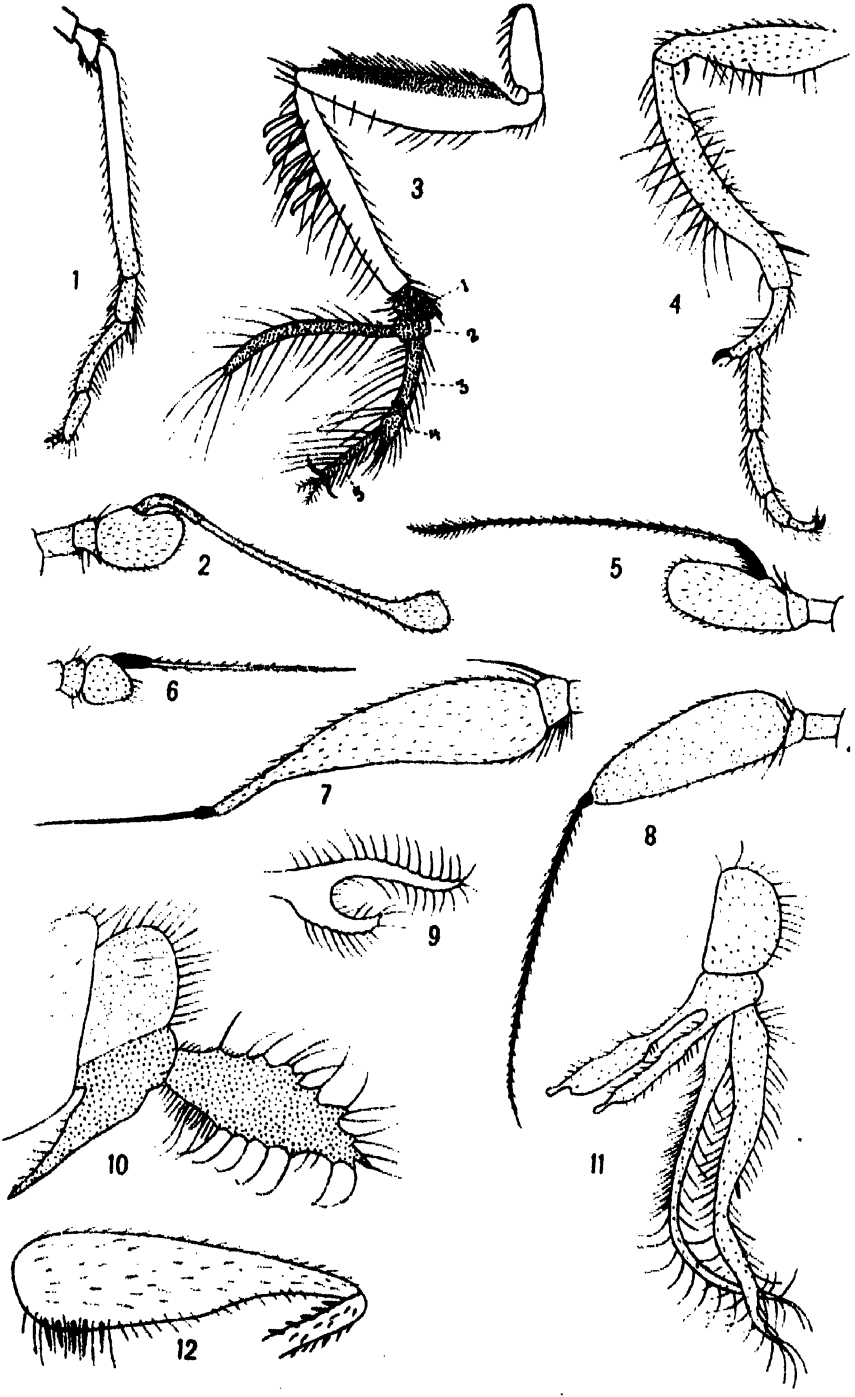
PELASTONEURUS VAGANS Loew.

Pelastoneurus vagans LOEW, Neue Beitr., vol. 8, p. 39, 1861; Smiths. Misc. Colls., No. 171, p. 107, 1864.

One male was taken at Anchorage, Alaska, July 19. Described from the "Middle States"; found all over the United States, Canada, and Mexico.

EXPLANATION OF PLATE.

FIG. 1. *Nothosympycnus cilifemoratus*, new species, fore tarsus of male.
2. Antenna of same.
3. *Campsionemus americanus*, new species, fore leg of male.
4. *Campsicnemus calcaratus*, new species, middle leg of male.
5. *Campsicnemus americanus*, new species, antenna of male.
6. *Campsicnemus calcaratus*, new species, antenna of male.
7. *Porphyrops albibarba*, new species, antenna of male.
8. *Porphyrops terminalis*, new species, antenna of male.
9. *Porphyrops nudus*, new species, outer hypopyginal lamella of male.
10. *Porphyrops albibarba*, new species, hypopygium of male.
11. *Porphyrops terminalis*, new species, hypopygium of male.
12. *Hydrophorus minimus*, new species, fore femora of male.



DOLICHOPOD FLIES FROM ALASKA

FOR EXPLANATION OF PLATE SEE PAGE 16

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